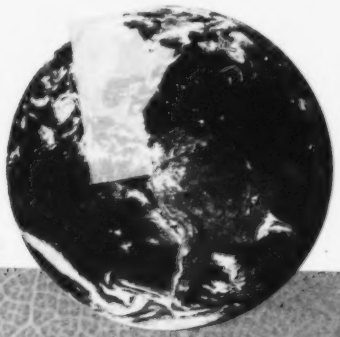
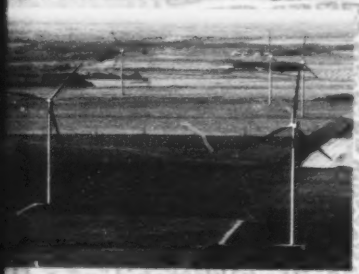
NEXT STEPS:

ACTION ON CLIMATE CHANGE





Beyond Kyoto

Manitoba's Green Future

Manitoba

Top 10 actions you can take

to reduce your personal greenhouse gas (GHG) emissions[1]

1. Reduce your home heating and cooling costs

ACTION	ANNUAL GHG REDUCTION
Insulate your home. Install a high efficiency furnace or geothermal system to heat and cool your home which can reduce your home heating bills by approximately 40% to 70% per year.	up to 10 tonnes

2. Drive your personal vehicle less – walk, bike, bus or carpool

ACTION	ANNUAL FUEL SAVINGS	ANNUAL COST SAVINGS $1.10 per litre	ANNUAL GHG REDUCTION
Bike or walk	2,300 litres	$2,500	5.5 tonnes
Use public transit	1,800 litres	$2,000 (minus cost of a bus pass)	5.0 tonnes
Carpool with one other person	1,100 litres	$1,200	2.5 tonnes

3. Drive the most efficient vehicle that can meet your needs

ACTION	ANNUAL FUEL SAVINGS	ANNUAL COST SAVINGS $1.10 PER LITRE	ANNUAL GHG REDUCTION
Upgrade from a pre-1995 to 2007 model vehicle resulting in 65 times fewer harmful emissions	1,000 litres	$1,100	2.5 tonnes

4. Keep your vehicle well maintained

ACTION	ANNUAL FUEL SAVINGS	ANNUAL COST SAVINGS $1.10 PER LITRE	ANNUAL GHG REDUCTION
Service your vehicle regularly to improve fuel efficiency by 15% to 50%	up to 1,000 litres	up to $1,100	up to 2.5 tonnes

5. Avoid the use of 2 stroke engines – boats, lawnmowers and snowmobiles

ACTION	ANNUAL FUEL SAVINGS	ANNUAL COST SAVINGS $1.10 PER LITRE	ANNUAL GHG REDUCTION
Upgrade from a 2 to 4 stroke lawn mower	35 - 325 litres	$40 - $350	Up to 0.8 tonne
Upgrade from a 2 stroke to an electric battery or push lawn mower	50 - 500 litres	$55 - $550	Up to 1.0 tonne

6. Be idle free - 10 seconds of idling uses more fuel than restarting your car

ACTION	ANNUAL FUEL SAVINGS	ANNUAL COST SAVINGS $1.10 PER LITRE	ANNUAL GHG REDUCTION
Idle 10 minutes less/day	100 litres	$110	0.25 tonne

7. Unplug or retire your second, older fridge

ACTION	ANNUAL ENERGY SAVINGS	ANNUAL COST SAVINGS	ANNUAL GHG REDUCTION
Unplug or retire old fridge	840 KWH	$42	0.5 tonne

8. Reduce, reuse, recycle and compost household waste

ACTION	ANNUAL GHG REDUCTION
Composting helps avoid the methane (CH_4) produced when organic matter breaks down in a landfill. Methane traps 21 times more heat than carbon dioxide (CO_2). Composting can reduce the amount of garbage your family produces by a third.	0.1 tonne

9. Carefully manage fertilizer application

Nitrogen-based fertilizers produce nitrous oxide (N_2O) which traps 310 times more heat reflected from the Earth than carbon dioxide and can cause surface and groundwater contamination. Consider organic options such as mulched lawn clippings and composted waste.

10. Plant trees

Planting trees around your home can save you an average of 20 to 25% in energy costs, in comparison to an unsheltered house. Trees also absorb carbon. Choose local species that are adapted to Manitoba's climate and require less water and maintennce.[2]

[1] Analysis based on data from Environment Canada http://www.ec.gc.ca/default.asp?lang=En&n=FD980E51-1

[2] Fuel consumption based on 16,000 km traveled annually an average fuel economy 15 L/100 km.

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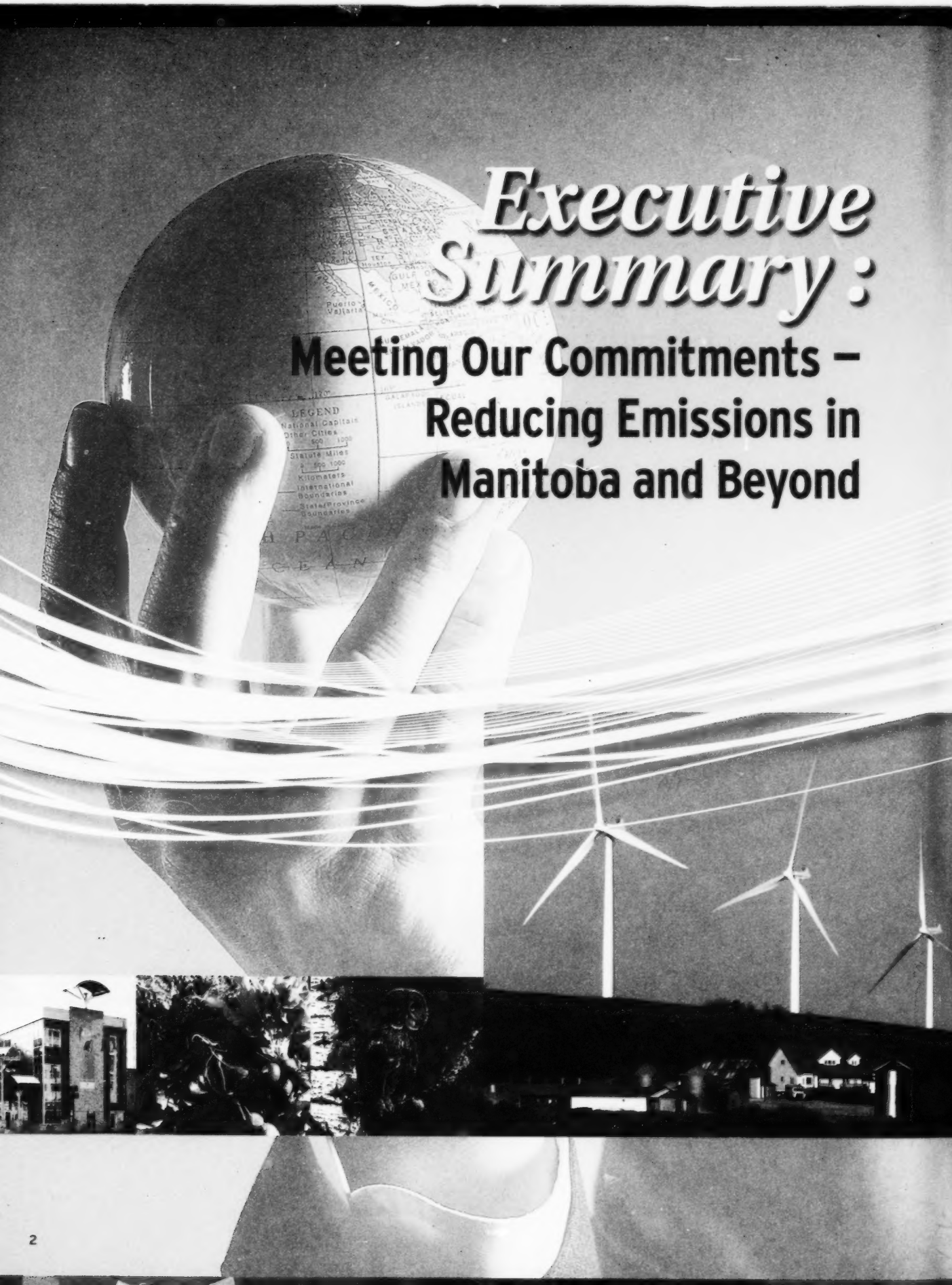


Executive Summary:

Meeting Our Commitments – Reducing Emissions in Manitoba and Beyond

84 per cent of Manitobans are concerned about climate change with **76 per cent** saying "that they are seeing or anticipate seeing impacts of climate change in their communities within five years."[3]

Manitoba has an abundance of renewable energy, natural resources, strong and vibrant communities and an innovative and hard working population. We are the first jurisdiction in Canada to reflect Kyoto targets in legislation and we will continue to lead in helping the world reduce global emissions.

Already, Manitobans can be proud of their leadership on climate change action. Although our greenhouse gas emissions are low compared to other jurisdictions, our citizens recognized early on that we must be part of the solution to this urgent global problem. Through the ***2001 Climate Change Task Force Report***[4] Manitobans raised concerns about the impacts of climate change on our lakes, forests, northern communities and agricultural regions. At the same time, Manitobans identified many benefits that could come from taking action.

RECOMMENDATIONS IN THE TASK FORCE REPORT INCLUDED:

- increased production of renewable energy and biofuels
- expansion of energy-efficiency efforts
- the need to address emissions from our transportation and agriculture sectors and the impacts of climate change in the north

The report also recommended a broader public awareness campaign and the development of regional and national partnerships. The Manitoba government accepted the report and in 2002 released Manitoba's first **Climate Change Action Plan**. Since that time, government, individuals, communities and businesses have been busy working together to implement a range of climate actions.

The foresight Manitobans showed in being concerned about climate change has proven itself today. Climate impacts have already been felt in our province with "one-in-100-year" flooding, drought and intense rainfall all in the last ten years.

Northern communities have been affected by unpredictable winter road conditions, making the transport of food, fuel and people more precarious. In the far north, polar bears are becoming thinner and are having fewer cubs as sea ice melts. Water quality issues, such as algae blooms on Lake Winnipeg, are becoming more of a problem, due to unpredictable and extreme weather conditions.

At the same time, since the release of the 2001 Task Force Report, **Manitoba has been internationally recognized as a leader on climate change action. Our province leads North America in the use of ground-source heat pumps, quadrupling annual installations in recent years.** Through innovative loan programs, Manitoba has been able to continue providing amongst the lowest heating and cooling costs on the continent to thousands of Manitoba homes, facilities and businesses.

[3] 2004 Kisquared Research Poll

[4] http://www.cecmanitoba.ca/Reports/PDF/ACF44A3.pdf

It is estimated that we will lose much of the southern and northern edges of our boreal forest by 2050.

It is essential that we sustainably manage Canada's boreal forest and peatlands because they store 67 billion tonnes of carbon.[5]

In Manitoba, there are many ongoing activities, including working together with the Government of Ontario and First Nations Communities to sustain one of the largest untouched tracts of boreal forest in North America through a UNESCO World Heritage Site nomination.

In 2001, Manitoba did not have a single wind monitoring station. Today, there are 99 megawatts (MW) of wind power being generated at the St. Leon wind farm. In 2008, Manitoba Hydro is evaluating its Request for Proposals for 300 MW of new wind development. Wind power production has also meant great economic benefits to local landowners and communities.

Manitoba's ethanol mandate is now in place across the province. The expanded Husky plant in Minnedosa is increasing ethanol production from 10 million litres per year to 130 million litres per year. As well, new biodiesel plants are coming on board, largely as a result of Manitoba's aggressive strategy. The strategy includes removal of the fuel tax from pure biodiesel and Manitoba plans to become the first Canadian province with a biodiesel mandate. This growth in biofuel production, based on non-food grains, will not only result in significant greenhouse gas (GHG) emission reductions but will also provide direct benefits to Manitoba farmers as well as savings to all Manitobans on imported fuel.

Green buildings are becoming the beacons of revitalization in Winnipeg's downtown. They include Red River College's award-winning Princess Street Campus; Manitoba Hydro's new headquarters (designed to be one of the most energy-efficient headquarters in the world); **and the University of Winnipeg's new Environmental College.** The latter two are aiming to achieve LEED® Gold certification. In addition, since April 2007, new public building and major renovation projects that are funded by the Government of Manitoba, are required to meet stringent standards for energy efficiency and environmental performance. Manitoba has updated residential energy codes and is also in the process of introducing a new energy code for the commercial building sector.

Manitoba's cities and communities are leading in climate action by adopting made-in-Manitoba biodiesel and hybrid buses for their transit fleets and increasing energy efficiency efforts in schools, churches and municipal buildings. New energy efficiency programs are being made more accessible to lower income neighbourhoods and northern communities. As an additional benefit, these programs include employment and training in efficiency retrofits for local residents.

Individual Manitobans themselves are becoming increasingly energy efficient by taking advantage of energy audits and home retrofit loans. Manitobans are recycling and composting more and using alternative forms of transportation, thanks to community-based programs such as the Climate Change Connection and the Commuter Challenge.

Manitoba is also beginning to prepare for necessary adaptations to our changing climate. In the north, winter roads are being moved onto land for greater predictability, and new investments are being made in year-round infrastructure, including bridges and all-weather roads. As well, greater efforts are being made to protect the natural resources which are the most vulnerable to climate change - our boreal forests, lakes, rivers and polar bear population.

All these efforts have contributed to lower emissions in our energy and building sectors, and have better prepared us for changes in our natural environment. We have learned from experience that these actions are not only good for our environment, they also provide economic benefits that lay the foundation for a future green economy in Manitoba.

[5] Anielski, Mark and Wilson, Sara. "Counting Canada's Natural Capital: Accessing the Real Value of Canada's Boreal Ecosystems." Canadian Boreal Initiative, 2005.

Manitoba Hydro's new energy-efficient head office is under construction in downtown Winnipeg

Manitoba was named the top regional jurisdiction in the world for action on climate change by BusinessWeek magazine in December 2005 –

"Sustainable development has become an economic lynchpin in the Canadian province of Manitoba."

Manitoba's green future

Manitoba has achieved a lot in a short time. But there is still more work to be done to reduce emissions both inside and outside our borders and move us to a greener economy.

We will build on our success in clean energy and energy efficiency by working to lower emissions in our transport and agricultural sectors. We are confident that action will lead to long-term environmental and economic benefits for all sectors in Manitoba.

In our transportation sector, greater use of biofuels and hybrid buses, incentives for low emitting vehicles, expanding plug-in technology, greater access to public transit, and biking and walking paths will help make our communities cleaner and greener, promote healthy lifestyles and, at the same time, support local economies.

In our agriculture sector, biofuel production, lowering on-farm energy use, supporting climate friendly cropping practices and organic and local food production will help reduce farm input costs, diversify the farm economy and lower greenhouse gas (GHG) emissions.

In Manitoba, all individuals, communities, producers, businesses, non-government organizations (NGOs) and governments have a role to play in working together to reduce emissions and create new economic opportunities. This updated plan contains:

- new actions for our transportation and agriculture sectors
- continued actions in our energy sector
- new opportunities to partner with Manitoba communities and businesses

Initiatives to further reduce emissions within government operations are also underway. Measures to meet Manitoba's targets will also be set out in new climate change legislation.

Meeting our Commitments – Reducing Emissions in Manitoba and Beyond

Manitoba is in a position to become one of the greenest jurisdictions on the continent and help the world reduce global emissions.

Since 2000, Manitoba's emissions have remained relatively stable and will decline by 2010. Recognizing that from year to year, reductions may be greater in some sectors and lesser in others, Manitoba aims to meet or exceed its Kyoto goals by reducing emissions by approximately three megatonnes (Mts) – from 20 Mts to 17 Mts by 2012 through in-Manitoba actions. This target will be reflected in new climate change legislation. **This will be the most aggressive legislative target of all regions in North America.**

Provincial Comparison of Greenhouse Gas Emissions Reduction Targets

PROVINCE	EMISSIONS REDUCTION TARGET	TIMELINE
British Columbia	33% below 2007 levels	by 2020
Alberta	14% below 2005 levels	by 2050
Saskatchewan	32% below 2004 levels	by 2020
Manitoba Meets Kyoto Target *Legislated target	**6% below 1990 levels**	**by 2012**
Ontario	6% below 1990 levels	By 2014
	15% below 1990 levels	by 2020
Quebec Meets Kyoto Target	6% below 1990 levels	by 2012
New Brunswick	To 1990 levels	by 2012
	10% below 1990 levels	by 2020
Nova Scotia	10% below 1990 levels	by 2020
Prince Edward Island**	10% below 1990 levels	by 2020
Newfoundland and Labrador**	10% below 1990 levels	by 2020
Yukon	No explicit target	n/a
Northwest Territories	No explicit target	n/a
Nunavut	No explicit target	n/a
Federal	20% below 2006 levels	by 2020
Kyoto Targets	6% below 1990 levels	by 2012
Western Climate Initiative	15% below 2005 levels (regional target)	by 2020

*Manitoba will be the first jurisdiction in Canada and the first regional jurisdiction in North America to legislate the 6% below 1990 level emissions target.

**Regional target agreed to as a member of New England Governors/Eastern Canadian Premiers

Highlights of Manitoba's updated climate action plan

TRANSPORTATION

HIGHLIGHTS INCLUDE:

- expanding biofuel production and use
- developing a new made-in-Manitoba vehicle standard (modeled after the California standard)
- creating a new Driving Green program (including the hybrid vehicle rebate, measures to speed up the retirement of older vehicles, banning the import of older high-emitting vehicles and expanded anti-idling programs)
- supporting public transit by legislating a 50/50 funding agreement to share net operating costs including rapid transit
- expanding alternative forms of transportation including public transit and new commuter cycling opportunities
- setting new green fleet standards for Manitoba government vehicles
- legislating the use of low-speed, low or zero-emission vehicles
- introducing new technologies such as plug-in hybrid vehicles

MANITOBA'S LARGE EMITTERS

HIGHLIGHTS INCLUDE:

- Brandon coal facility; reductions from a phase down of Manitoba's last remaining coal-fired generating station mandated by new climate change legislation
- large landfills; reductions of methane from large landfills mandated by new climate change legislation
- other large emitters; coal-reduction strategy, including a tax on coal emissions and enhanced CO_2 capture projects

EXPANDING CLEAN ENERGY

HIGHLIGHTS INCLUDE:

- expanding energy efficiency through new building codes and standards and expanding programs for homeowners, including low-income housing across the province
- expanding energy efficiency through new programs for businesses and farms and new initiatives to promote energy efficient appliances
- expanding renewable power production through hydroelectric, wind, solar and biomass power production
- expanding green heat alternatives through greater support for geothermal and biomass
- new coal reduction strategy including a tax on coal emissions
- introducing new technologies such as air-to-air heat pumps

AGRICULTURE, FORESTRY AND COMMUNITY PROGRAMS

HIGHLIGHTS INCLUDE:

- expanding woodlot programs
- planting five million trees
- creating a new Manitoba Sustainable Agriculture Practices Program aimed at best practices to reduce on-farm GHG emissions including cropping and livestock strategies and wetland restoration incentives
- providing new support for municipal waste reduction including composting, water and energy efficiency, and transportation demand management

ADDITIONAL REDUCTIONS

- future climate action investments

REDUCTION GOALS

Transportation	**Up to one Mt**
Manitoba's large emitters	**– 650,000 tonnes**
Expanding clean energy	**– 670,000 tonnes**
Agriculture, forestry and community programs	**– 680,000 tonnes**
Future climate action investments	**– 250,000 tonnes or more**
TOTAL REDUCTIONS IN MANITOBA	**Over – 3.0 Mt**

Beyond 2012

By meeting our 2012 targets Manitoba is on track to be the first jurisdiction to meet commitments under the Western Climate Initiative.

It is important to note that when Manitoba released its first action plan in 2002, it was to support an anticipated national framework to meet Canada's international Kyoto obligations. In this updated climate change plan, Manitoba is demonstrating that we have acted and will continue to act with or without a national Kyoto framework, and forge partnerships at a provincial and state level.

To this end, Manitoba has reached out to other Canadian premiers, and to mid-west and western United States governors, in an effort to work with these jurisdictions to address their climate change challenges. For example, by meeting our 2012 targets Manitoba is on track to be the first jurisdiction to meet commitments under the Western Climate Initiative.

Because Manitoba's emissions are low, the province's greatest contribution will be to lead the way on clean energy, energy efficiency, sustaining our forests and other measures that will help reduce or offset the emissions of fossil-fuel generation to the east, west and south of our province.

Already these activities contribute approximately 12 Mt in net reductions for our planet. This is equivalent to over half of Manitoba's total emissions. With continued actions in these areas we can make an even greater contribution to global emission reductions. New climate change legislation will require reporting on Manitoba's maximum contribution to reducing global emissions between 2020 and 2025.

Finally, and most importantly, this updated plan recognizes that Manitoba's 2012 goal is just a stop along the way to a green and low-carbon economy. As we look beyond 2012, we see opportunities to reduce our reliance on fossil fuels and create a self reliant and sustainable economy in a way that few other jurisdictions can. **Manitoba will aim to become coal-free and the lowest carbon economy on the continent.** We will aim to lead the way in low-carbon transportation systems through technologies such as the plug-in hybrid vehicle and expanding alternatives to vehicle use. We are setting the stage to become leaders in sustainable food and fibre production and in sustainable forest management and protection. In 2008 we will set longer range targets to reduce even further our reliance on gasoline, natural gas and coal.

We know we are up to the challenge of continuing our leadership on climate change action. And we will continue to lay the foundation for a healthy environment and a green, low-carbon economy that will benefit citizens both within and outside of Manitoba, for generations to come.

Overview:
What climate change means to Manitoba

We are increasingly witnessing the consequences of a warming world: less predictable weather patterns; more frequent and intense extreme weather; and the arrival of new plants and animals in the province. These are all hallmarks of what are expected to be among the most significant economic and environmental challenges of the 21st century: climate change.

"Unless action is taken now to set in motion a worldwide transition to a low carbon economy, some scenarios suggest that by 2040, the world could experience annual economic losses as high as USD $1 trillion."[8]

Spring is expected to arrive earlier and be wetter; followed by warmer and drier summers. Winters should be milder, with a **"diminished snowpack."**[6] **Extreme weather like droughts, heat waves, hailstorms, tornadoes, intense rainstorms and floods are expected to be more frequent and more intense.**[7]

By 2080, average summer temperatures in Manitoba are projected to be 3°C to 4°C higher than today. Even greater warming could take place during the winter months, with average temperatures rising by 5°C to 8°C. This warming trend will bring changes in precipitation, evaporation, humidity and wind patterns.

Rising permafrost temperatures are expected to cause roads, railways and building foundations to buckle and deteriorate. Changing ecological conditions are expected to include grasslands moving further north, edging out the boreal forests.

Forests will also be at risk of increased fires and disease. Warmer temperatures will present health problems through illnesses caused by heat, increased dust in the air and vector-borne diseases such as Hantaviruses, West Nile virus and Lyme disease. Thinning sea ice will make it more difficult for polar bears to hunt for seals.

There will be significant economic costs if nothing is done about the impacts of climate change. We've already felt these economic upsets close to home in recent years. The 1997 Flood of the Century, for example, cost the province $380 million. In 2003, the costs from forest fires across Manitoba totalled $64,837,155, and the Canadian economy lost $5 billion due to drought on the Prairies between 2000 and 2003. According to the United Nations Environment Program's Finance Initiative: **"Unless action is taken now to set in motion a worldwide transition to a low-carbon economy, some scenarios suggest that by 2040, the world could experience annual economic losses as high as USD $1 trillion."**[8]

[6] Manitoba Clean Environment Commission and the International Institute for Sustainable Development. Manitoba and Climate Change: A Primer. http://www.iisd.org/pdf/cc_2nd_ed_wcov.pdf

[7] Canadian Environmental Assessment Agency. Appendix A: Summary of Projected Regional Climate Change Impacts. Water Supply and Demand. http://www.ceaa-acee.gc.ca/015/0002/0004/appendixA_e.htm#Anchor-10501

[8] Adaptation and Vulnerability to Climate Change: The Role of the Finance Sector. UNEP FI Climate Change Working Group. December 2006.

Manitoba in the Global Context

The climate changes that we are beginning to feel in Manitoba are part of a larger global experience. The Intergovernmental Panel on Climate Change, a body composed of leading scientists from around the world, projects that between 1900 and 2100, average temperatures on the Earth will have risen by 1.4°C to 5.8°C.[9] The consequences of this rise in average temperatures are expected to be profound.

Warming of more than 3°C could result in "serious risk of large scale, irreversible system disruption." Beyond this threshold, irreversible catastrophic events such as the melting of the Greenland Icecap or the shutting down of the Atlantic Current that warms the North Atlantic countries could take place.[10] Already, the insurance industry has characterized climate change as perhaps the greatest threat in its history.[11] Annual losses just from hurricanes in the United States, typhoons in Japan and windstorms in Europe, are projected to increase to $27 billion per year by 2080.[12]

To prevent climate change from occurring faster than humanity can adapt, greenhouse gases will need to be reduced by approximately 60 per cent, globally, by 2050. To achieve this critical target, urgent action is needed in the next couple of years. Key actions, such as finding alternatives to burning fossil fuels (coal, oil) that release greenhouse gases, and preserving carbon sinks (forests and grasslands) need to be put in place as soon as possible.

Manitoba's contribution to Canada's greenhouse gas (GHG) emissions

Manitoba has one of the lowest rates of greenhouse gas emissions in Canada, and the lowest among the western Canadian provinces. Past investments in hydroelectric power production and energy efficiency have helped Manitoba maintain the lowest percentage of emissions from its energy sector.

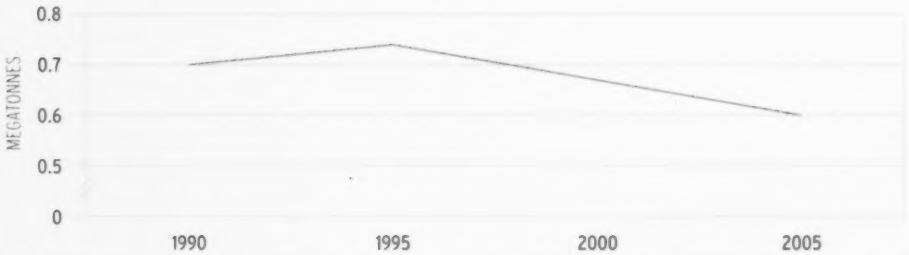
We have succeeded in reducing emissions generated by our energy and industrial sectors. Emissions from residential buildings, pipelines and mineral production are on a downward trend. Manitoba is actively managing emissions from its thermal power production. It has retired four coal units in Brandon and converted two units at Selkirk to lower-emission, natural-gas generation.

As well, the province has been able to limit the growth of its emissions relative to the expansion of its economy. Provincial actions have helped reduce emissions, per billion dollars of Gross Domestic Product (GDP) by 13 per cent between 1990 and 2005 – from 0.70 Mt/$B GDP to 0.60 Mt/$B GDP).

Provincial actions have helped reduce emissions

per billion dollars of Gross Domestic Product (GDP) by 13 per cent between 1990 and 2004 (from 0.70 megatonnes (Mt)/$B GDP to 0.61 Mt/$B GDP).

MEGATONNES OF GHG EMISSIONS IN MANITOBA PER $1 BILLION GDP



[9] The rate of change will be even greater in northern countries. Canada is already warming faster than the global average. While global average temperatures rose by 0.6°C over the past century, the temperature in Canada south of the 60th parallel rose by 0.9°C. Even greater warming took place in the north; in the Mackenzie Basin, average temperatures increased by 2°C.

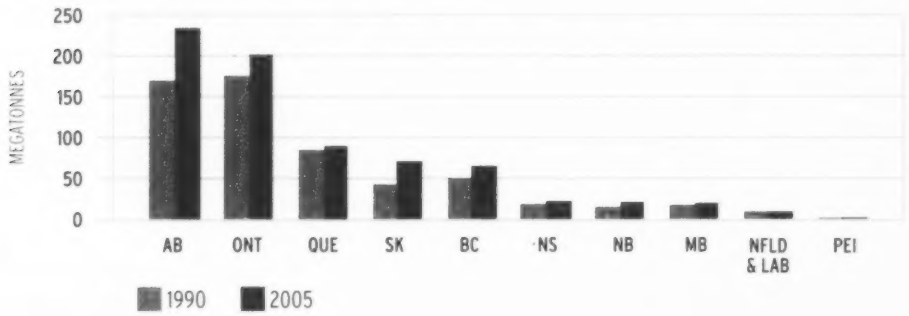
[10] International Scientific Steering Committee. 2005. Avoiding Dangerous Climate Change: International Symposium on the Stabilization of Greenhouse Gas Concentrations. Exeter, UK. 1 - 3 February.

[11] Ceres. 2006. Dozens of new insurance products emerging to tackle climate change and rising weather losses.

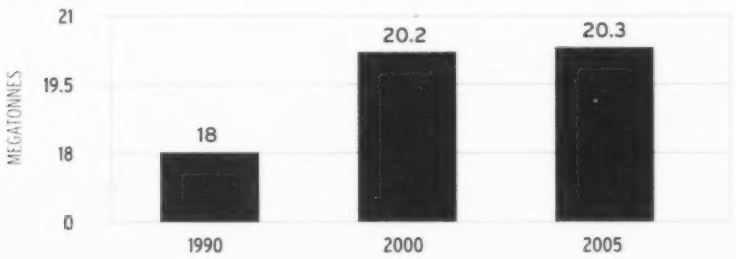
[12] Association of British Insurers. 2005. Financial Risks of Climate Change Summary Report. http://www.abi.org.uk/Display/default.asp?Menu_ID=716&Menu_All=714,718,0,&Child_I

Our emissions, however, rose slightly since 1990 – up from 18 Mt of carbon dioxide equivalent (CO_2e) in 1990 to 20.2 MT CO_2e in 2000 to 20.3 in 2005.[13] **Between 1990 and 2000, emissions rose by 2.2 Mt, but since 2000, they have risen by only 100,000 tonnes.** Recent Environment Canada reports show a reduction from Manitoba's single-point sources of emissions of 400,000 tonnes, putting current total emissions at 19.9 MTs (pending release of Environment Canada's complete 2006 inventory). **At the national level, Manitoba's net-emission increases since 1990 are much smaller than those of other Canadian provinces.** However, Manitoba remains committed to reducing its contribution to global emissions. New initiatives are needed to help reduce total emissions to six per cent below 1990 levels, or 17 MT CO_2e.

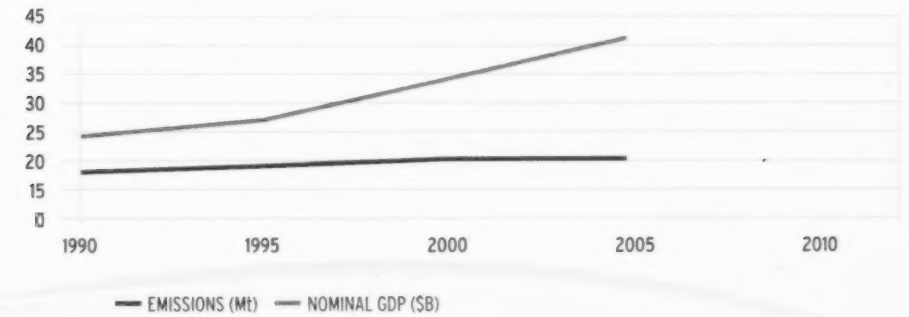
TRENDS IN GHG EMISSIONS IN CANADA, 1990-2005



GHG EMISSIONS IN MANITOBA, 1990-2005



NOMINAL GDP AND GHG EMISSIONS IN MANITOBA, 1990-2000[14]

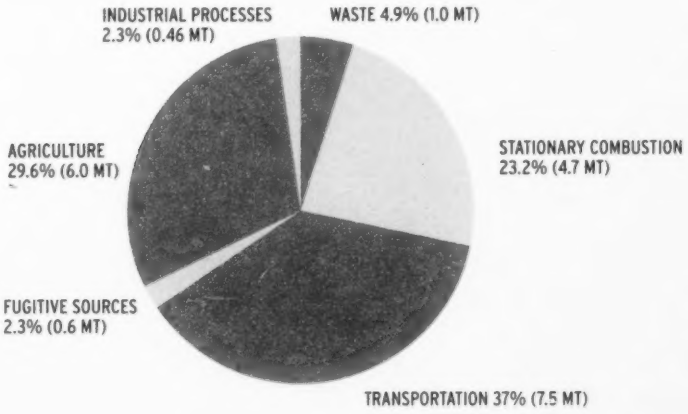


[13] Environment Canada (2007). National Inventory Report, Greenhouse Gas Sources and Sinks in Canada 1990-2005.

[14] Environment Canada (2007). National Inventory Report, Greenhouse Gas Sources and Sinks in Canada 1990-2005.
Manitoba Bureau of Statistics, 2008

Transportation and agriculture are the primary sources of greenhouse gas emissions in Manitoba. Emissions from the transportation sector – aviation, vehicles, off-road equipment, railways and pipelines – made up 37 per cent of provincial emissions in 2005. Of the 11-billion vehicle kilometres travelled in Manitoba in 2005, half occurred within the City of Winnipeg.[15]

MANITOBA GHG EMISSIONS BY CATEGORY, 2005



In 2005, agricultural activities produced 29.6 per cent of Manitoba's emissions (excluding emissions from off-road farm equipment). More than 40 per cent of agriculture emissions come from agriculture soils (with about half of that coming from the application of nitrogen-based fertilizers). The remainder comes through enteric fermentation (41 per cent) and manure management (16 per cent).

Manitoba's updated plan, therefore, includes new initiatives to support emission reductions in our transportation and agriculture sectors. These programs will once again put Manitoba in a leadership position in reducing emissions here at home and sharing best practices beyond our borders.

Manitoba's updated plan, therefore, includes new initiatives to support emission reductions in our transportation and agriculture sectors. These programs will once again put **Manitoba in a leadership position** in reducing emissions here at home and sharing best practices beyond our borders.

A global partner

Manitoba is a leader in the fight against climate change, alongside partners in Canada and around the world.

The Declaration of the Federated States and Regional Governments on Climate Change was a product of the 2005 Climate Leaders Summit, hosted by Québec and Manitoba. It coincided with the 11th UN Conference of the Parties meeting in Montreal. Manitoba and Quebec, along with a host of provincial, state and regional governments from around the world, agreed to expand renewable energy and energy efficiency; find cleaner forms of transportation; reduce waste; and improve sustainable agriculture and forestry practices to reduce global GHGs. Since that time, all participants have made significant strides in all areas of emission reductions and will report back on these actions at the time of the United Nations Conference of the Parties meeting in 2008.

Manitoba and Quebec, along with a host of provincial, state and regional governments from around the world, agreed to **expand renewable energy and energy efficiency; find cleaner forms of transportation; reduce waste; and improve sustainable agriculture and forestry practices to reduce global GHGs.**

Since then, Manitoba has entered partnerships with the states of California and South Australia to advance climate change action at the regional level. The province has also partnered with the Province of Quebec to establish a commitment among provincial, state and regional leaders worldwide. They agreed to take decisive action on climate change today.

[15] Centre for Sustainable Transportation, Greenhouse Gas Baseline Emissions for the City of Winnipeg, 2007

By acting today to reduce our emissions, Manitobans are establishing themselves as leaders for tomorrow.

Western Climate Initiative

Manitoba is a member of the Western Climate Initiative (WCI). As part of its commitment, Manitoba and other WCI members established a western regional GHG emissions reduction goal. Members also agreed to share best practices and design a multi-sector, market-based mechanism to help reach this goal.

The Climate Registry

WCI members have joined the Climate Registry, a GHG-emissions registry consisting of more than 40 U.S. states, tribes, Mexican states, and all Canadian provinces and territories. The registry is a collaborative effort aimed at developing and managing a common greenhouse gas emissions reporting system. The system will support various greenhouse gas emission reporting and reduction policies for its members and provide a consistent, transparent set of data on greenhouse gas emissions for North America. **Manitoba is developing a first-of-its-kind emissions offsets registry that will link with this North American effort.**

Midwestern Governors Association (MGA)

Manitoba has joined mid-western states in setting regional targets for measures such as energy efficiency, renewable energy and biofuels. Manitoba will pursue initiatives to reduce carbon emissions and promote clean energy production and use. The Energy Security and Climate Stewardship Summit, organized by the MGA, brought together leaders to discuss renewable energy and alternative fuels, energy efficiency and a reliable regional electric grid. The Mid-western Greenhouse Gas Reduction Accord will establish regional targets for reducing greenhouse gases.

Beyond 2012

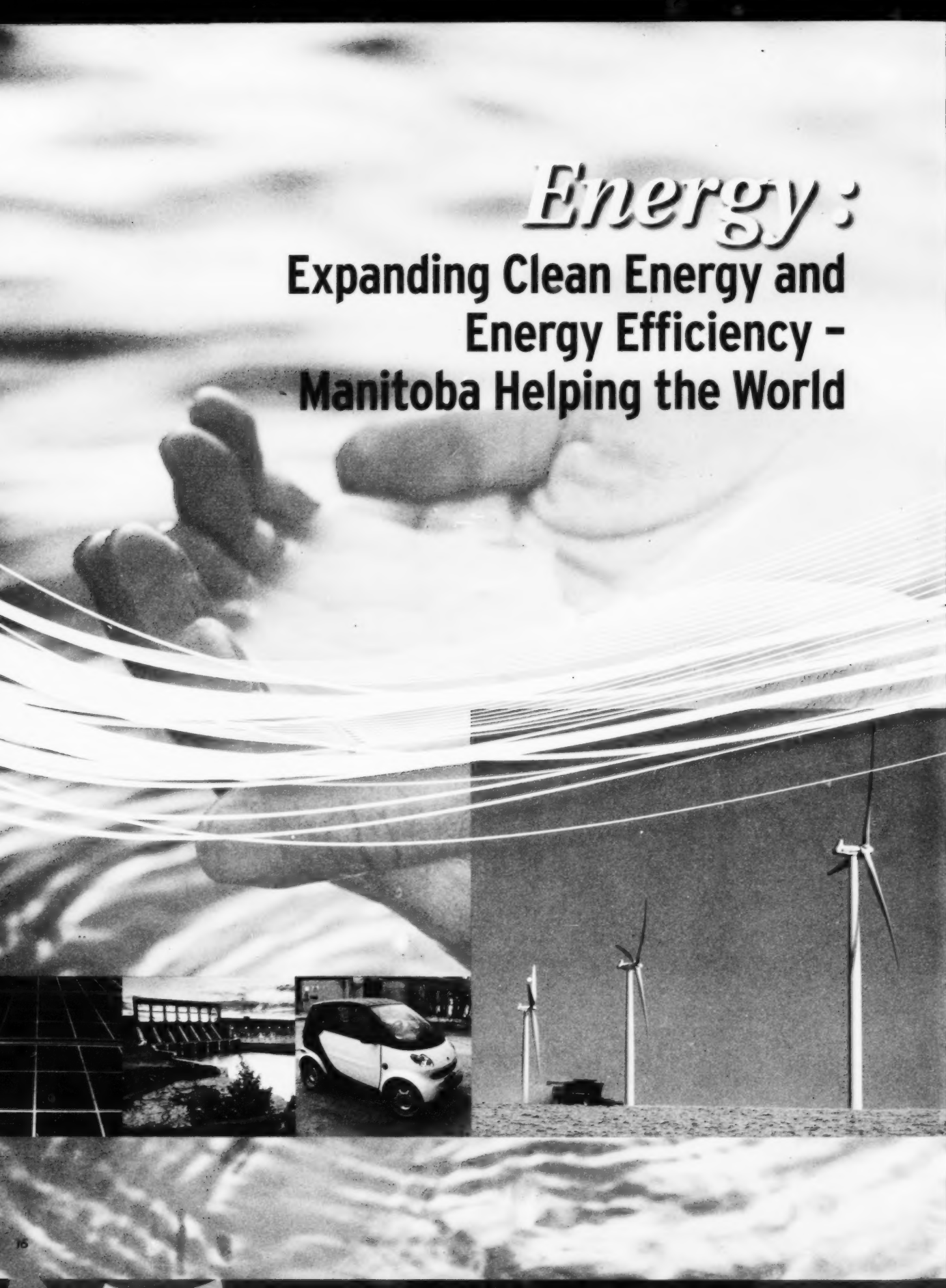
The international community has begun to focus on designing a more effective, inclusive, long-term approach to address climate change in the post-2012 period. A number of initiatives are underway, including the implementation of the Kyoto Protocol and a post-2012 process, launched at the November 2005 climate change meetings held in Montreal.

More recently, the 2007 UN conference in Bali produced an international agreement. It was the first confirming that all countries in the world will agree to either targets, or commitments, to reduce greenhouse gas emissions in the post-2012 period. The agreement focused on many areas that Manitoba has been working on for several years. These include using green technology, sustaining our forests and preparing for climate change impacts. **Given Manitoba's early start, the province now has an opportunity to act not only on behalf of our own citizens, but also to share our experiences in addressing climate change with the broader international community.**

More and more nations are beginning to recognize that international action is needed to avoid the serious risk of large scale, irreversible disruption from an ever warming planet. This means very deep emissions reductions will be required by the middle of this century. By acting today to reduce our emissions, Manitobans are establishing themselves as leaders for tomorrow.

Energy:

Expanding Clean Energy and Energy Efficiency – Manitoba Helping the World



Manitoba is fortunate to have access to many sources of renewable energy. Our provincial greenhouse gas (GHG) emissions are comparatively low, in part, because 98 per cent of Manitoba's electricity generation comes from renewable water power.

Our fortunes are further improved by the specific local geography and new engineering designs which provide hydro options with very little flooding. These types of hydro opportunities have greatly reduced significant impacts on the surrounding environment.

It makes good sense for Manitoba to continue to invest in energy efficiency and all forms of renewable energy production. These investments not only keep our emissions low here at home, they also contribute to greater emissions reductions outside our province, through our export of clean energy to replace fossil-fuel power in other jurisdictions. New investments in wind and energy efficiency will add to Manitoba's ability to displace fossil fuels outside our borders.

Manitoba received an
"A" rating
from the Canadian Energy Efficiency Alliance (CEEA)

Expanding Manitoba's clean energy portfolio has already earned the province much success. In 2004 and again in 2006, **Manitoba received an "A" rating from the Canadian Energy Efficiency Alliance (CEEA)**, a non-profit organization charged with promoting energy efficiency in Canada. This grade was the highest in the country, and it was the second time in a row Manitoba led the nation. New programs to retrofit low-income housing across Manitoba build on this success and provide multiple benefits. These include savings on utility bills for low-income families, local employment and training opportunities, improved housing stock as well as GHG reductions.

Manitoba has an abundance of both wind and water. In fact, hydro provides a perfect backup system for wind power. We can store water when the wind is blowing and release water to generate electricity when the wind is calm. Wind power investments continue to grow and new, low-impact, hydro generation is under construction. As well, green heat alternatives, which include geothermal and biomass energy, are widely used in Manitoba, thanks to low-interest loans and other support.

All these strengths will help Manitoba improve our standing as a clean energy provider and meet our **future goal: to be coal-free and have one of the lowest carbon-energy systems on the continent.**

One coal-fired station can emit nearly as much as the total emissions for all of Manitoba.

The greatest impact of Manitoba's clean energy production will be felt in other jurisdictions. By importing Manitoba's clean hydropower, these regions can eliminate emissions from coal-fired and other fossil fuel energy sources.

Actions to date

ENERGY EFFICIENCY

- Manitoba Hydro Power Smart programs. Between 1985 and 2005/06, provincial energy-efficiency activities have achieved GHG emission reductions of over 767,000 tonnes. Manitobans have seen the savings on their energy bills (more than $228 million in total) as a result of these upgrades.

- A new $35-million fund has been established (using profits from Manitoba Hydro's electricity exports) to target home-efficiency upgrades especially for low-income families, and for alternative energy research and development such as geothermal power. The best example of the multiple benefits of energy efficiency can be seen in the Low Income Energy Efficiency Initiative. Over 150 low-income dwellings have been retrofitted in Winnipeg and Brandon. This has saved approximately $400 per household on annual utility costs, while providing lasting employment skills to local residents.

Red River College

- Green buildings. Manitoba currently has 32 projects registered with the Canada Green Building Council (CaGBC). The provincial government has a new Green Building Policy that applies to new residential, commercial and institutional projects funded by the Government of Manitoba, including Crown corporations and agencies.

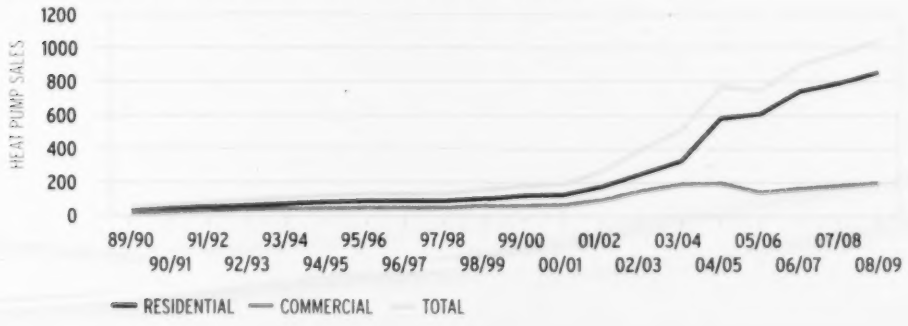
  This policy requires all new capital projects, including schools and health care facilities, to be certified at a minimum LEED® (Leadership in Energy and Environmental Design) Silver standard by the CaGBC, and exceed Model National Energy Code of Canada requirements by at least 33 per cent. The University of Manitoba is one of the first universities in Canada to offer LEED® accreditation courses to students for academic credit.

EARTH ENERGY (GEOTHERMAL POWER)

Manitoba Hydro offers homeowners low-interest loans to assist with the cost of installing geothermal heat pumps.

- Since 2000, Manitoba has quadrupled its annual rate of heat pump installations; has trained over half of Canada's heat pump installers; and has been recognized as a national leader in the adoption of geothermal technology. Manitoba Hydro offers low interest on-bill financing for residential installations and incentives for many commercial installations, including $1.7 million in incentives for commercial customers alone. Other measures also encourage the use of energy efficient appliances. Manitoba's domestic geothermal heat pump industry has grown from $3 million to $30 million annually, during the same period.

MANITOBA GEOTHERMAL HEAT PUMP SALES, 1989/90-2008/09



Energy-efficient buildings deliver significant cost savings.

For example, new buildings that participate in the federal Commercial Building Incentive Program (CBIP) have averaged approximately **36 per cent** reductions in energy use, compared to the 1997 Model National Energy Code of Canada for Buildings.

WIND ENERGY

- **Wind monitoring sites located in the province have increased from zero in 2001 to more than 70 in 2006.**
- **Manitoba's first wind farm at St. Leon generates 99 megawatts (MW) of clean power. The 63 wind turbines represent a $210-million project that will result in significant employment opportunities; $20 million in municipal taxes; and approximately $10 million in local landholder payments over the 25-year lifespan of the project.** In addition, having a 99-MW wind farm up and running is equivalent to reducing 260,000 tonnes of global GHG emissions and can have the same positive impact as taking 50,000 cars off the road or planting 1.2 million trees.[16]

WATER ENERGY

- **The 200-MW Wuskwatim Hydro Station on the Burntwood River is now under construction.** To minimize flooding, the station was redesigned from a 340-MW to a 200-MW station. This change reduced flooding from 140 square kilometres to less than one-half a square kilometre. The Wuskwatim project is a partnership with the Nisichawayasihk Cree Nation.
- In the longer term, the 1,250-MW Conawapa project offers similar opportunities to produce power with very little impact on the environment, compared to other renewable forms of power generation. The project also has the potential to reduce global GHG emissions by seven megatonnes.

MINIMIZING RELIANCE ON FOSSIL FUELS

- Since 1990, Manitoba Hydro has worked to minimize reliance on fossil fuels in Manitoba's energy system, by shutting down four of Brandon's five coal-fired generating stations, converting the Selkirk Generating Station from coal to natural gas, and extending the power grid to eight northern communities previously served by diesel generation. Manitoba Hydro's diesel generation emissions have been cut nearly in half since 1990.

Next steps: to 2012 and beyond

EXPANDING ENERGY EFFICIENCY

- **In 2006, Manitoba Hydro announced targets for even greater Power Smart savings – to 848 MW and 2,695 gigawatt hours (GWh) of electricity savings and 101-million cubic metres of natural gas savings by 2017/2018.** These combined savings are expected to result in total global GHG emissions reductions of 2.01 million tonnes by 2017/18.
- **An energy code will be required as part of the Commercial Building Code by 2010.** Manitoba has begun implementing some of the recommendations of the Energy Code Advisory Committee (www.gov.mb.ca/est/energy/pdf/ecac_report.pdf). This includes holding stakeholder consultations in the fall of 2008, before establishing an energy code in Manitoba.
- **Manitoba will require minimum efficiency standards for natural gas furnaces by 2009.**

[16] Manitoba Science, Technology, Energy and Mines, Energy Development Initiative

- **A Lower Income Energy Efficiency Program was launched by Manitoba Hydro in December 2007. It is based on the two successful pilot projects; one launched in Winnipeg's inner city; and one in Brandon's low-income neighbourhoods.** The Winnipeg project, in the Centennial Street neighbourhood, has retrofitted over 110 homes since December 2006. The Brandon project has retrofitted 48 homes since fall 2007. Partnering with the federal government, the goal will be to roll out the new program province-wide with a target of 4,600 low-income dwellings to be retrofitted over the next three years.

- **An energy-efficiency pilot program for First Nations is also underway in the Island Lake Community.** This winter road community is actually comprised of four First Nations: Garden Hill, St. Theresa Point, Red Sucker Lake and Wasagamak. This project will target 101 homes across the four communities.

- **The provincial government's Green Building Policy that requires a minimum of LEED® Silver standards will be enshrined in new climate change legislation.**

Expanding green heat

EARTH ENERGY (GEOTHERMAL POWER)

- **The province and Manitoba Hydro will continue to work with the building and geothermal industries to help increase geothermal uptake in Manitoba. Manitoba Hydro's Earth Power Program** will continue to align itself with the changing needs of the industry and the market. In 2007, the loan program offered homeowners up to $20,000 at a new low interest rate, to help with the upfront investment of installing a geothermal heat pump.

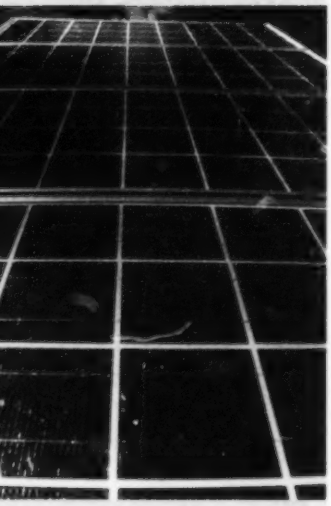
- **The Manitoba Geothermal Energy Alliance (MGEA) will expand its certification and training requirements.** A new quality assurance program funded by the Manitoba Government will provide a high quality of service from any certified MGEA installer.

- **The province is also intensifying its commitment to geothermal energy through the Manitoba Green Building Policy, Manitoba Hydro's Earth Power Program**, and demonstrations of new heat-pump technologies.

- New climate change legislation will ensure that property owners are not at a disadvantage in the assessment process for having geothermal installations.

BIOMASS ENERGY

- The province will provide funding to expand opportunities to use biomass as an alternative energy source in Manitoba.



Expanding renewable power generation

- Building on Manitoba's renewable hydro-electric power base, there will be continued progress towards more renewable power such as wind. As evidence of future growth in alternative energies, Manitoba Hydro is evaluating its 300 MW Request for Proposals in 2008.
- Wind monitoring towers are being erected in off-grid, diesel-serviced communities.
- Solar energy is increasingly being used by Winnipeg's green buildings, in several of the city's swimming pools, and at a downtown, low-income, high-rise buildings.
- The province funds research into solar power. Demonstration projects and broader applications of this renewable energy, such as solar hot water heaters, are being explored.

MOVING TO A COAL-FREE MANITOBA

With the conversion of the Selkirk facility to natural gas in 2002, the coal-fired electrical generating station in Brandon is the last coal-fired facility in Manitoba. Through new climate change legislation, restrictions will be placed on the use of the facility; it will be used only to support emergency operations, such as times of drought. In addition, a new coal-reduction strategy and a new tax on coal emissions will be introduced.

FROM FOSSIL FUELS TO RENEWABLES IN OFF-GRID COMMUNITIES

New climate change legislation will require that options be developed to move off-grid, remote, northern communities (supplied only by diesel power) onto a secure supply of renewable energy.

ENHANCED OIL RECOVERY

Carbon dioxide based oil recovery – where CO_2 is injected underground for enhanced oil recovery – may reduce Manitoba's CO_2 emissions by storing the CO_2 that would otherwise be released into the atmosphere. A pilot project in southwestern Manitoba is already underway to evaluate the technical and economic feasibility of injecting CO_2 into Manitoba oil pools.

BECOMING THE CONTINENT'S LOWEST CARBON LEADER

The measures outlined in this plan make Manitoba one of the lowest carbon jurisdictions on the continent.

Further longer term targets to reduce Manitoba's reliance on fossil fuels, including gasoline, natural gas and coal, will be outlined in a **new energy strategy**, to be released by fall 2008.

Transportation :

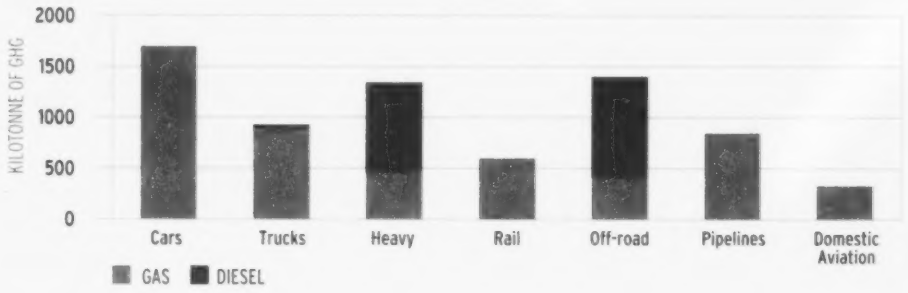
Greening our Transportation Sector

Manitoba and Winnipeg are founded on historical transportation links that continue to support a strong freight warehousing, forwarding and distribution network in central North America. Transportation is important to the provincial economy, generating about seven per cent of the gross domestic product (GDP) and employing over 40,000 people. Transportation is a diverse demand-driven activity which is directly linked to our level of economic activity. As a result,

reducing GHG emissions in this sector will require an innovative approach. As Manitoba continues to develop as an international transportation hub, incorporating green policies into this growing sector will become increasingly important.

Transportation activities, including road, rail, marine, air and off-road vehicles, are Manitoba's largest source of greenhouse gas (GHG) emissions. They account for approximately 37 per cent of Manitoba's total emissions. Environment Canada reports that in 2005, Manitoba's road transportation emissions were 18.6 per cent above 1990 levels. Emissions from rail transportation have decreased 50 per cent (0.3 Mt) from 1990 levels due to declining use of this mode. Over the same time period, emissions from heavy trucking have increased by 80 per cent (0.71 Mt) above 1990 levels. While emissions from light duty gasoline vehicles are 32 per cent (0.52 Mt) lower today than in 1990, this gain has been eroded by a growing preference for trucks and SUVs, which have experienced an 87 per cent (0.77 Mt) increase in emissions from 1990 levels.

EMISSIONS FROM TRANSPORTATION IN MANITOBA – 2005



Transportation demand is increasing, and energy use and emissions from transportation activities are forecasted to rise. A study completed by Transport Canada in 2006 indicated that traffic congestion in Winnipeg may cost our economy up to $104 million annually in lost time, increased fuel costs and GHG emissions. Apart from greenhouse gases, air toxins in vehicle emissions can create ground-level ozone, contribute to smog and impair air quality. There is a growing realization that the non-renewable fossil fuels and individual personal transportation practices that we have been relying on are not sustainable.

The provincial government will continue to advance its leadership in sustainable transportation measures, including GHG emissions reductions. Provincial activities in this area include increased funding for public transit, biking and walking trails, a biofuels mandate, tax incentives, support for biofuels production, incentives for low-emitting vehicles and converting the government fleet to more highly efficient vehicles. The province also funds agencies that provide research, outreach and education on sustainable transportation.

Actions to date

ALTERNATIVE TRANSPORTATION

- Since 1999, the province's annual transit operating grant to Winnipeg has increased more than 40 per cent to $22.9 million, with an 18 per cent increase in 2006 alone. Transit capital grants to Winnipeg have increased 28 per cent. **Also, in 2006, Winnipeg received $3.8 million in capital support for projects to improve ridership and promote an environmentally friendly transit system. This includes support for new diesel hybrid-electric buses.**

- To date, the provincial government has contributed $3.7 million for trails projects across Manitoba. In addition, **through its participation in the WinSmart program, Manitoba has contributed $550,000 toward construction of a dedicated cycling and walking network from Jubilee Avenue to downtown.** The province also provides support to the Winnipeg Trails Association and the Manitoba Recreational Trails Association. The Bishop Grandin Greenway and the Marconi Line are examples of community-led trail projects that will become legacies to future generations.

- Resource Conservation Manitoba (a non-profit community group) receives Provincial funding to run successful programs including Active and Safe Routes to School, Workplace Transportation Demand Management, Campus Challenge, the Student Transportation Network and the annual Commuter Challenge.

- Manitoba Health and Healthy Living and Helmets R Us worked together to provide more than 13,000 low-cost safety-certified bike helmets to Manitoba students and their families.

REDUCING VEHICLE EMISSIONS

- Since January 2008, the oil and gas industry has been required to replace 8.5 per cent of its gasoline needs with clean burning ethanol. **The completion of a new 130-million litre-per-year ethanol plant in Minnedosa will enable Manitoba to meet this mandate. The province has established a biodiesel target and no longer collects the 11.5-cent fuel tax on biodiesel.** In addition, Manitoba released a 10-point action plan to promote biodiesel and develop a local production capacity. A world-class biodiesel testing facility is now operating in Selkirk.

- Manitoba recently launched successful biodiesel demonstration projects in large, commercial fleets with Manitoba Hydro; school buses with Winnipeg School Division Number One; and the trucking industry through Border Chemical.

- **Hudson Bay Mining and Smelting is currently testing biodiesel blended fuel in its underground mining operations.** The use of biodiesel in underground operations may lead not only to emission reductions, but may also have important health and safety benefits for workers.

Non-government organizations in Manitoba, including the Lung Association, Diabetes Foundation and Kidney Foundation, cumulatively **remove up to 4,000 older, high emitting vehicles** from our roads every year through their voluntary donation programs.

Between 10 per cent and 15 per cent of light-duty vehicles in Canada are pre-1996, generating up to 50 per cent more GHGs and air pollutants than newer vehicles.

Stonewall's ***Idle-Free Girls*** are committed to helping the planet as well as motivating adults and other students to get involved. Their efforts have resulted in Idle Free signs all over their community.
(left to right) Destiny Gulewich, Katelyn Morran, (a young fan - Kaile Gulewich), Rachel Perrella and Neely Swanson.

- **An E85 fuel station has been established in Winnipeg to provide E85 gasoline to provincial fleet vehicles.** Between March and October of 2006, about 22,000 litres were used by provincial vehicles reducing GHG emissions by about 25,000 kilograms. The Manitoba government's provincial fleet currently has 340 E85 vehicles, 29 hybrid electric vehicles, and one Smart Car.
- **In 2006, the province announced a $2,000 rebate on new hybrid vehicles bought in Manitoba.** Hybrid vehicles offer significant fuel savings over conventional vehicles. As a result, sales of hybrid vehicles have doubled in Manitoba. This rebate program is among the most generous in Canada.
- **To encourage sustainable driving habits, the Climate Change Connection, a community organization funded by the province, continues to run an extremely successful vehicle anti-idling campaign.** It has established 300 idle-free zones across Manitoba.

Financial costs of $200 million annually to buy fossil fuels from outside of the province are being entirely offset by equivalent investments in local biofuel production.

ADVANCING LOW-EMISSION VEHICLE TECHNOLOGY

- Manitoba is advancing low-emission bus technologies by leading a consortium of local organizations in successful, cold-weather testing of a New Flyer Hydrogen Hybrid Internal Combustion Engine Bus with Winnipeg Transit. Manitoba is also collaborating with the federal government and Hydrogenics to conduct a demonstration of a New Flyer Hydrogen Hybrid Fuel Cell Bus in Winnipeg. **In 2006, a business consortium, including New Flyer Industries, ISE Corporation and SunLine Transit, announced that it will receive $9 million from the United States Federal Transit Administration for two new projects involving hydrogen and fuel cell buses.**
- **The Plug-in Highway Program is a Manitoba Hydro and University of Manitoba initiative that is advancing the process of substituting electricity for fossil fuels in transportation.** This is achieved by linking a variety of technologies, including plug-in hybrid electric vehicles (PHEVs) and truck stop electrification. The University of Manitoba and Manitoba Hydro are running trials on converted plug-in hybrid electric vehicles (PHEV). In 2007 Manitoba hosted Canada's largest conference on PHEV technology.
- **Winnipeg's Centre for Sustainable Transportation was formed to help overcome barriers to attaining sustainable transportation**, in Canada and elsewhere, by providing balanced information and analysis. The role of the Centre is to help decision-makers in making appropriate choices regarding how Canada's transportation systems are planned and delivered.

The plug-in hybrid electric vehicle (PHEV) can travel a distance of up to 20 kilometres (12.5 miles) on a full electric charge without using any gasoline.

When the charge is used up, the vehicle continues to operate as a hybrid electric vehicle, resulting in reduced fuel costs and fewer emissions.

For more information go to: **hydro.mb.ca/**

- **Red River Community College's planned training and research programs will build Manitoba-based research and advanced training in leading edge technologies such as biofuels, hydrogen fuel cells, hydrogen and electric hybrids and emissions and cold-weather testing.** In addition, a new $15.1 million training facility will provide young Manitobans with related research opportunities to support Manitoba's growing green economy.

Next steps: to 2012 and beyond

ALTERNATIVE TRANSPORTATION

- **The province will set up an Active Transportation Advisory Group to provide recommendations to the Minister on expanding active transportation opportunities in our province.**

The Province of Manitoba is providing funding for 20 New Flyer hybrid-electric buses to add to Winnipeg Transit's fleet.

- **PUBLIC TRANSPORTATION.** In addition to increased investments in public transit, Manitoba, in partnership with the City of Winnipeg, recently winter tested an 18 meter articulated, hybrid diesel-electric bus along the Pembina Corridor. Pending successful winter testing and with funding from the province, Winnipeg Transit intends to add 20 new hybrid-electric buses to its fleet over the next two years, and upgrade the Telebus system to provide real-time information on bus arrivals and departures. Starting in 2007, Manitoba municipalities received $12.6 million for their public transit systems, supported with funds from the federal Public Transit Capital Trust. **Manitoba will support public transit by legislating a 50/50 funding agreement to share net operating costs including future rapid transit.**

- **ACTIVE TRANSPORTATION PATHWAYS.** The province has committed $6 million to the City of Winnipeg's trail system. To improve opportunities for active commuting, a new trail from Jubilee Avenue to downtown is being built with a provincial contribution of $550,000.

- **EXPANDING GREEN COMMUTING OPPORTUNITIES.** The province will partner with the other levels of government, Crown corporations and the private sector to explore opportunities to broaden green commuting opportunities including:
  - improving local active commuting infrastructure, such as designated bike lanes and secure bicycle parking facilities
  - public education and outreach
  - broadening participation in Winnipeg Transit's EcoPass program

- **COMMUNITY-BASED INITIATIVES. The province is working with Resource Conservation Manitoba (RCM) to develop a household marketing campaign to provide incentives for Winnipeg citizens to modify their transportation choices and reduce single-occupancy vehicle trips.** The province will work with RCM on a year-round workplace commuter challenge.

In 2006, Bison Transport received the U.S. Environment Protection Agency (EPA) SmartWay Environmental Excellence Award.

The award recognized the company's efforts to protect the environment through its equipment purchasing decisions, effective marketing of fuel-efficient driving techniques and its full-motion simulation fuel management course that all Bison Transport drivers are required to complete. The company has also been honoured with the Truckload Carriers Association National Fleet Safety Grand Prize and has been named one of Canada's 50 Best Managed Companies.

DRIVING GREEN

- **EXPANDING BIOFUELS PRODUCTION. In addition to *The Biofuels Act* passed in 2003 establishing an ethanol mandate (effective in 2008), the Manitoba government is establishing a first-of-its-kind biodiesel mandate.** Manitoba is the first province in Canada to adopt legislation providing this authority. It is anticipated that four biodiesel plants could be in operation by 2008, with annual production reaching 85 million litres by 2012 or earlier.

- **SUPPORTING SUSTAINABLE TRUCKING PRACTICES. Through WinSmart, Manitoba Infrastructure and Transportation will research efficient freight-transportation practices.** New initiatives totalling $1.5 million will be provided to help Manitoba's heavy trucking sector adopt new sustainable trucking practices and technologies.

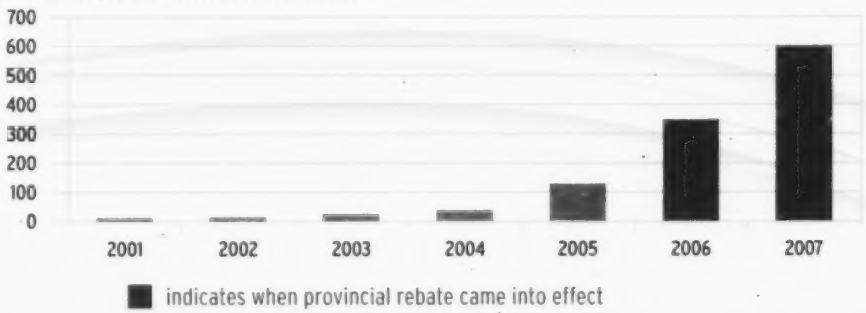
- **MADE-IN-MANITOBA VEHICLE STANDARD.** Of the approximately 45,000 new vehicles sold in Manitoba each year[17], only about 6,000 achieve fuel economy of 5.9 litres per 100 kilometre (40 miles per U.S. gallon) or greater. Manitoba's existing private vehicle fleet achieves, on average, 19.1 miles per U.S. gallon per vehicle. **New climate change legislation will require a made-in-Manitoba approach to ensure that a greater percentage of high-efficiency vehicles become part of the private fleet.** A Vehicle Standards Advisory Board will be established to help determine an efficiency standard or emissions standard to take effect, in conjunction with the California standard, by 2010.

- **DRIVING GREEN MANITOBA.** The provincial government will work with not-for-profit organizations to increase the attrition rate of older high emitting vehicles. Enhanced incentives will be offered to Manitobans interested in getting rid of their older vehicles and choosing a cleaner alternative. In addition, this new program will focus on influencing changes in behaviour in the ways that Manitobans buy, drive and maintain their vehicles to reduce energy use and greenhouse gas emissions. The program will include tips on buying a new or used vehicle, green driving and maintenance tips and tips to reduce vehicle idling.

- **MANDATING a PROVINCE of MANITOBA GREEN FLEET POLICY. The provincial government will establish a standard for all newly purchased and leased light duty/passenger vehicles to meet high-efficiency and lower emissions ratings.** This will start with an executive fleet policy requiring the use of hybrid electric vehicles. This policy will be legislated and extended to include efficiency or fuel-mix standards for heavy duty fleet vehicles, in conjunction with the province's biodiesel mandate by 2010.

- **EXPANDING UPTAKE of LOW and ZERO EMISSION VEHICLES.** Hybrid electric vehicles converted using PHEV technology have the potential to reduce vehicle GHG emissions and fuel costs by two-thirds, compared to conventional vehicles. **Manitoba's advanced demonstration project will include the conversion of up to 15 vehicles into plug-in hybrid electric vehicles over the next two years.** In addition, new climate change legislation will enable the use of low-speed, low and zero emission vehicles in Manitoba.

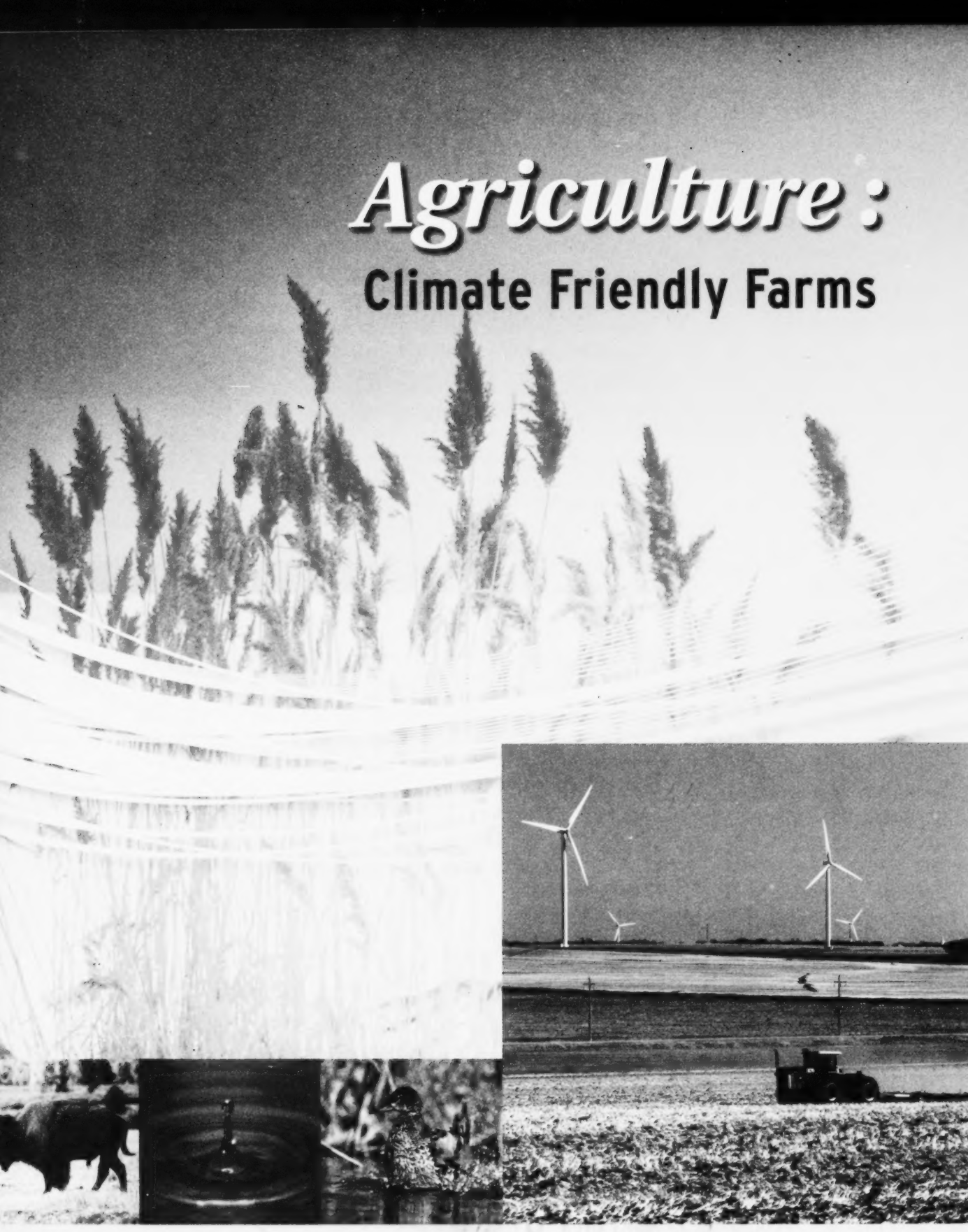
NEWLY REGISTERED HYBRID VEHICLES



[17] http://www.statcan.ca/english/research/11-621-MIE/11-621-MIE2007054.htm#6

Agriculture :

Climate Friendly Farms



Agriculture is an important income generating sector in Manitoba, accounting for about 12 per cent of the province's GDP when related activities are included.

More than 98 per cent of Manitoba farms are family owned.

A pilot project in the Rural Municipality of Blanshard - the first of its kind in Canada -

has 75 per cent of farmers preserving wetlands and riparian areas, and protecting natural areas

In 2005, Manitoba's agriculture sector represented approximately 29.6 per cent of the province's overall greenhouse gas (GHG) emissions. Forty-three per cent of agricultural emissions came from agricultural soils, 41.6 per cent from livestock enteric fermentation and 15.8 per cent from manure management. Of the agricultural GHGs produced, roughly 55 per cent were nitrous oxide (N_2O) and 45 per cent were methane (CH_4). Manitoba agricultural soils could be considered as a sink for carbon dioxide (CO_2), mainly as a result of reduced tillage.

Through climate-friendly best management practices, the agriculture sector can reduce emissions by 250,000 tonnes by 2012. When new woodlot and wetlands programs are added, this figure rises even higher. Through the use of climate-friendly beneficial management practices (BMPs) such as sustainable cropping systems, more efficient use of nitrogen fertilizers, better manure management, and alternative feeding and grazing practices, it may be possible to reduce emissions by up to 20 per cent to 30 per cent by 2020.

Farmers across Manitoba are already implementing BMPs and are being recognized for their leadership in environmental stewardship. For example, more than 6,000 producers in Manitoba have participated in Environmental Farm Planning, with almost 7.6 million acres influenced to date. In addition, a pilot project in the Rural Municipality of Blanshard (the first of its kind in Canada), has 75 per cent of farmers preserving wetlands and riparian areas, and protecting natural areas, in exchange for payments of $5 to $25 per acre.

Regulations being introduced under *The Water Protection Act* as well as related financial incentives, can also reduce nitrous oxide and methane emissions.

Acting on climate change will provide new opportunities for producers to adopt more sustainable farming practices, diversify farming operations, reduce input costs, become involved in producing renewable energy and find additional sources of income through access to carbon trading markets. These changes coincide with shifts in consumer buying patterns that reflect a growing interest in environmentally friendly food choices.

Climate-friendly best-management practices include:

With reduced tillage practices, Manitoba's agricultural soils are considered a sink for carbon dioxide.

- more efficient use of commercial nitrogen fertilizers, such as adjusting application rates and methods, time of application, use of inhibitors and new proposed technologies to reduce N_2O emissions
- expanded soil surveys to provide landscape information and support environmentally sustainable decision-making
- anaerobic digestion of manure captures CH_4 emissions and the subsequent application of the digested manure shows a reduction in N_2O emissions, in comparison to untreated manure
- composted manure to produce fewer greenhouse gas emissions than stockpiling it
- improved handling, treatment, storage and application of manure to reduce CH_4 and N_2O emissions
- biofuels production to reduce reliance on fossil fuels and decrease CO_2 emissions
- livestock feeding and grazing strategies to reduce CH_4 emissions
- reduced tillage practices to prevent soil erosion, conserve soil moisture and reduce fossil fuel use and CO_2 emissions
- controlled stubble burning program to prevent the release of CO_2 from crop residues into the atmosphere and provide feedstock opportunities for the bio-economy such as bio-energy, fibre and other bio-products
- increased use of perennial forages and legumes in crop rotations to reduce N_2O emissions
- land management practices for carbon sequestration, such as wetland restoration, permanent cover, afforestation and riparian area improvement
- organic farming

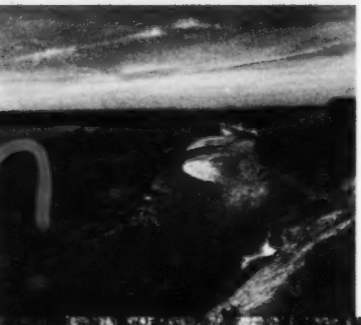
Actions to date

- **COVERING NEW GROUND.** Funding is in place for various projects related to sustainable farm production practices, including enhancing carbon sinks and reducing GHG emissions.
- **RIPARIAN TAX CREDIT.** Tax incentives for producers help them upgrade the management of lakeshores and river/stream banks for environmental benefit. Recent program improvements were included in 2007.
- **RETAIL SALES TAX EXEMPTION FOR MANURE TREATMENT EQUIPMENT.** This incentive to promote environmentally safe handling of manure on farm livestock operations works by providing a Provincial Sales Tax (PST) break on equipment such as slurry tanks, lagoon liners, biodigesters, composters and separation systems.
- **MANITOBA AGRICULTURAL SERVICES CORPORATION.** The Environmental Enhancement Loans and Alternative Energy Program help producers become more environmentally sustainable.

- **AGRICULTURAL POLICY FRAMEWORK (APF).** Environmental Farm Planning and the associated Canada-Manitoba Stewardship Program ($32.67 million between 2003 and 2008) foster the health of soil, water, air and biodiversity through incentives from BMPs. The APF program will be replaced by an interim extension agreement of up to one year. The new long-term agreement, Growing Forward, is being negotiated and will take effect within a year of the old agreement.
- **BMP WATER PROTECTION TOP-UP.** This program funds up to 25 per cent of the costs associated with implementing BMPs related to water management, with GHG emission reduction benefits.
- **MARKETING SUPPORT FOR ORGANIC FARMING.** This funding for the Manitoba Organic Marketplace Trade Association Pool helps promote organic products grown by certified organic producers in Manitoba.
- **BIOGAS RESEARCH ON MANITOBA HOG FARMS.** This funding of $300,000 is supporting the construction and feasibility assessment of anaerobic digesters for hog manure at three Manitoba operations.

Next steps: to 2012 and beyond

EXPANDING SUSTAINABLE FARM PRACTICES



- **MANITOBA SUSTAINABLE AGRICULTURE PRACTICES PROGRAM.** The program will build on existing sustainable farm practices. The province will provide technical and financial assistance to producers for reductions in GHG emissions, adaptation to climate change and participation in the new low-carbon economy. Through strategic investment, the program will enable farmers to adopt BMPs and achieve GHG emission reductions, along with benefits such as improved soil and water quality. In economic terms, the program will help producers buffer the cost of moving to more sustainable farming practices and increase resiliency on the farm. Potential economic benefits may include reduced production costs, competitive advantages, credits to sell on the carbon market, lower input costs and emerging eco-markets. Manitoba's agricultural sector is being consulted in the design of the program.

- **CLIMATE-FRIENDLY FARM WOODLOT PRACTICES.** This program will enhance carbon sequestration and ecological resilience by rejuvenating woodlots. It will also stimulate rural economic development and bioenergy crop options in Manitoba. The province will provide extension services to farm producers to implement sustainable woodlot management and build capacity for bioenergy production. It will provide direct payments to producers to implement BMPs supporting environmentally sensitive logging and regeneration. It will also provide training to micro-forestry entrepreneurs to minimize the environmental impacts of logging and maximize economic returns.

- **CROP RESIDUE BURNING REDUCTION PROGRAM.** The program will provide a comprehensive approach to address the issue of crop-residue burning and the resulting GHG emissions, air quality, human health concerns and farm crop-management challenges that arise from this practice. This program will also provide alternatives such as using crop residue for biomass energy.

- **NUTRIENT MANAGEMENT FINANCIAL ASSISTANCE PROGRAM.** Funding of $2.5 million will help producers adapt their operations to comply with new water protection regulations.

- **ODOUR CONTROL TAX CREDIT.** Since 2006, agricultural land owners have been eligible for a new odour control property tax credit to offset 10 per cent of the purchase price of eligible odour control equipment. This equipment includes manure storage covers and anaerobic digesters. Using this type of equipment provides benefits to the climate by reducing methane emissions. The new tax credit may be claimed instead of the odour control corporation tax credit, which has been enhanced.

- **EXPANDING ORGANIC FARMING OPPORTUNITIES.** Many sustainable farm practices are already being undertaken by organic farmers. Manitoba Agriculture, Food and Rural Initiatives (MAFRI) has established an office specializing in organic farming support. Organic farming may include many practices that benefit climate protection including zero synthetic fertilizer use, crop rotation, cover crops, integrated farming systems and integrated pest management practices. Organic products are gaining in market share. While production costs can be higher, returns can be up to 30 per cent to 50 per cent greater than from conventional products, with additional savings on input costs.

  Further support for marketing organic products in Manitoba was provided in early 2007 with the introduction of *The Organic Agricultural Products Act*. The proposed act defines the basis for organic food production and establishes mandatory standards for food products that carry the organic label. The goal is to give consumers greater assurance that organic production standards are monitored and enforced. The act would also cover organic livestock feed and aquaculture products. **New funding will be introduced to help producers with the costs of moving from conventional to organic food production.**

SUPPORTING LOCAL DISTRIBUTION

Buying locally grown food brings further climate and economic benefits to Manitoba by reducing transport emissions and providing greater markets for farmers here at home.

- **Grassroots initiatives** including the 100-Mile Diet encourages people to eat food grown within a 100-mile radius of where they live. The Manitoba Climate change Action Fund will support and expand Manitoba local food programs. **www.100milemanitoba.org**

- **In the Pembina region**, Manitoba Agriculture, Food and Rural Initiatives (MAFRI) has initiated a local food distribution network.

- **MAFRI** has posted a list of local food suppliers for Manitoba consumers interested in buying locally grown and processed foods. **www.gov.mb.ca/agriculture/food/consumers/index.html**

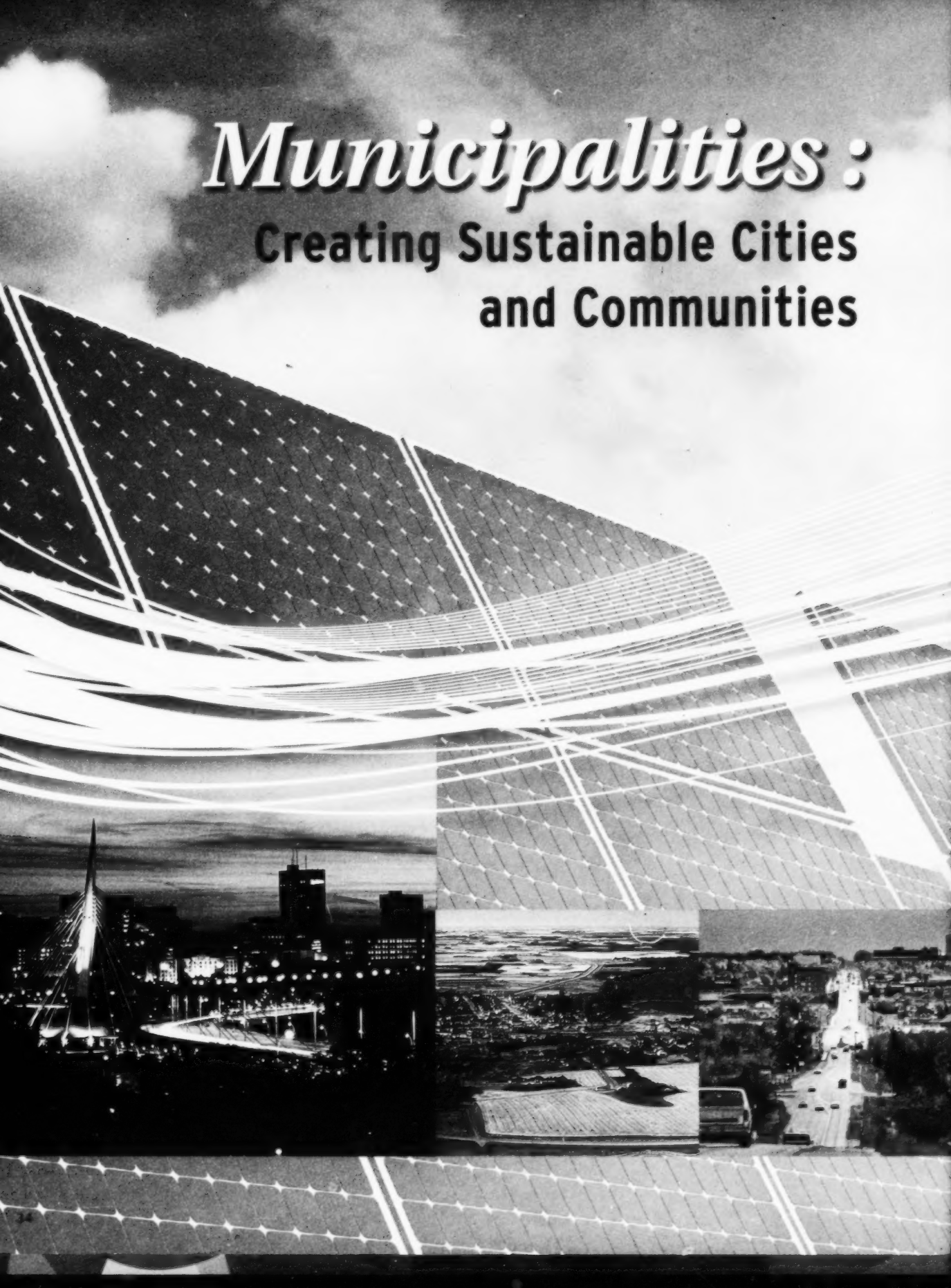
- **In northern Manitoba**, a new healthy foods initiative receives climate funding to support greenhouses and local community gardens to both reduce transport emissions and adapt to a changing climate. **www.gov.mb.ca/residents/mbfood.html**

- **MANITOBA CLIMATE CHANGE REGISTRY.** Carbon trading in the agriculture sector is already underway, with Prairie farmers selling carbon credits through private companies to the Chicago Climate Exchange (CCX). While these early credit trading agreements are creating a new market, Manitoba requires a system to verify agricultural carbon credits. The Manitoba government has signed an agreement with the Canadian Climate Exchange and Canadian Standards Association to develop a credit registry in Manitoba. A web portal will be launched in 2008 where green projects can be listed. Sessions are also underway to have Manitoba entities trained as verifiers.

ON-FARM ENERGY

- **AGRI-ENERGY DEVELOPMENT.** The development of biofuels, biomass energy, wind and solar power help broaden Manitoba's clean energy supply, reduce emissions and diversify the farming economy.
- **BIOFUELS.** Manitoba has one of the strongest mandates and incentives for ethanol and biodiesel in Canada. The province is supporting the development of community-based biodiesel production facilities and investigating the potential of on-farm ethanol and biodiesel production.
- **BIOMASS.** Manitoba's Agri-Energy office is working with producers to develop opportunities for the use of biomass energy. The benefits of pelletizing crop residues and dedicated perennial crops are being studied, which will ultimately enhance environmental stewardship and energy self-sufficiency on the farm.
- **WIND POWER.** In 2006, the first stage, the 99-megawatt, $210-million St. Leon wind project, with 63 wind turbines, was completed. It will provide $10 million in direct payments to local landowners.
- **BIOPRODUCTS STRATEGY.** Manitoba is developing a strategy for the bioproducts industry to provide opportunities for a sustainable rural bio-economy that benefits producers and rural communities.

Municipalities:
Creating Sustainable Cities and Communities



Up to one-half of Canada's greenhouse gas (GHG) emissions are under the direct or indirect control or influence of municipal governments (Federation of Canadian Municipalities). The choices we make, individually and as members of our community, may contribute to climate change or help mitigate its effects. By providing support to our cities and communities for better public transit systems, bike paths, walking trails, energy efficient buildings, waste reduction initiatives, as well as information and resources on climate friendly choices, **we are working together to develop unique local solutions to the global problem of climate change.**

In response, towns like Morden have introduced ground-source heat pumps, installed low energy use LED lights and improved energy efficiency. The City of Brandon has introduced a biodiesel bus that runs on used cooking oil that would otherwise be discarded. We must build on these partnerships to address our larger sources of emissions in this sector, and continue to focus on the successful efforts of citizens and communities across our province.

The Centre for Sustainable Transportation at the University of Winnipeg notes that 50 per cent of Manitoba's transportation emissions occur within the City of Winnipeg. While a number of transportation initiatives are outlined in this report, these must be accompanied by wise planning decisions. The location of new subdivisions, businesses and public facilities can have a significant impact on municipal GHG emissions, in the absence of sustainable land-use planning, particularly for transportation.

Another significant source of GHG emissions in this sector comes from municipal landfill sites. Many jurisdictions across Canada have tackled methane emissions from their landfills by capturing and flaring the gas or using it as an energy source. There is more work to be done, together, to lower these emissions and take advantage of the potential economic benefits that come from acting on this issue.

Further actions in communities across Manitoba are supported by local non-profit organizations such as Resource Conservation Manitoba, the Manitoba Eco-Network, the Climate Change Connection, Fort Whyte Alive and the Centre for Indigenous Environmental Resources. Thanks to their continued dedication and ability to partner with other local organizations and businesses, citizens and communities are becoming increasingly aware of their contribution to climate change and how they can become part of the solution.

Actions to date

CLIMATE-FRIENDLY PLANNING

- **INNER-CITY HOUSING.** Profits from the Waverly West development will be invested in Winnipeg's inner city. Investing in sustainable communities in the inner city will reduce transportation emissions and make our capital city a more vibrant place to live and work. As part of this effort, 120 homes in Winnipeg's Centennial neighbourhood will be retrofitted with energy and water-saving materials. The initiative is expected to deliver $30,000 in energy savings and $25,000 in reduced water bills, and will save more than 10 million litres of water per year.

- **THE ISLAND LAKE ENERGY EFFICIENCY PILOT INITIATIVE.** This initiative is working with Island Lake communities and Manitoba Hydro to use locally produced materials and support local training and employment to retrofit homes, with a focus on energy efficiency.

- **NEIGHBOURHOODS ALIVE!** This successful initiative continues to be expanded, which means more resources to support community revitalization in designated neighbourhoods in Winnipeg, Selkirk, Portage la Prairie, Brandon, Dauphin, The Pas and Thompson. Providing affordable, energy-efficient housing and infill development has significant community and climate change benefits.

- **SUSTAINABLE LAND PLANNING.** Communities on the east side of Lake Winnipeg have dedicated themselves to sustainable land planning supported by the province. They are looking to ensure the sustainability of the boreal forest and their communities through careful planning. This includes both protection of the forest and exploring new economic development opportunities including ecotourism, energy efficiency, alternative energy development and the nomination of part of the area as a UNESCO World Heritage Site.

- **COMMUNITY PLACES PROGRAM.** This program provides funding and planning assistance to municipalities and non-profit community organizations for facility construction, upgrading, expansion or acquisition projects. Eligible projects provide sustainable recreational and wellness benefits to communities. Non-profit organizations can apply for assistance with critical building repairs, energy saving initiatives and user-related improvements.

"Several benefits to the community have evolved, including GHG reduction in municipal operations and community outreach pertaining to environmental conservation. Morden hopes to continue the momentum while considering energy efficiency with each decision we make."

- Ernie Epp,
Chief Administrative Officer,
Morden, Manitoba

SUPPORTING COMMUNITY-BASED CLIMATE ACTION

- **THE CLIMATE CHANGE CONNECTION (C3).** Funded in part by the Manitoba government and hosted by The Manitoba Eco-Network Inc., C3 has been the Manitoba's climate-change public education and outreach hub since 2001. It has been very successful in creating awareness about climate change and empowering Manitobans to take action to reduce their GHG emissions. The organization manages a comprehensive website, a successful anti-idling campaign and the development and distribution of toolkits, brochures and climate friendly guides for business, communities and agriculture. They also run community and youth forums across the province, deliver climate change presentations to the public and support Manitoba's Climate Change Community Challenge.

- **MUNICIPALITIES.** The Climate Change Community Challenge was a pilot program designed to develop and implement locally based solutions to climate change in four Manitoba communities. Projects ranged from waste reduction, energy efficiency and sustainable transportation to outreach and awareness, capacity building and the use of innovative technologies.

- **GREENING OUR SCHOOLS.** Manitoba Education, Citizenship and Youth (MECY) is identifying existing climate change education resources in the province's kindergarten to Grade 12 system. MECY will develop interdisciplinary units on climate change and a complete climate change unit for teachers. Manitoba schools have also been provided with the video "Sila Alangotok - Inuit Observations on Climate Change," produced by the International Institute for Sustainable Development.

  In 2001, a Power Smart Energy Program initiated between the Pembina Trails School Division and Manitoba Hydro enabled the school division to significantly reduce annual utility costs (electricity, natural gas, water and solid waste).

  The Pembina Trails School Division has also installed water reduction devices at selected schools in the division. Based on preliminary numbers, water utility costs at the schools are projected to drop by approximately $75,000 per year.

- **RESOURCE CONSERVATION MANITOBA (RCM).** RCM is a non-profit, non-governmental centre for environmental education and applied sustainability. Households, workplaces, schools and communities count on RCM for practical information on active transportation, composting, waste reduction and resource conservation. RCM serves as a critical link to various partners and community networks due to its ability to identify simple, everyday solutions for the countless consumer habits that contribute to climate change.

Next steps: to 2012 and beyond

CLIMATE FRIENDLY PLANNING

The province is updating its provincial land-use policies. This will ensure that local development plans and ongoing land-use and development decisions reflect Manitoba's climate change mitigation and adaptation objectives.

EXPANDING COMMUNITY BASED ACTION

- **Provincial landfill gas (LFG) management and mitigation strategy.** Sending our waste to landfills results in large releases of methane into the atmosphere. The province will work with municipalities to reduce GHG emissions from large landfills by capturing methane and flaring it or using it for power generation. It will also work to reduce the amount of organic waste being sent to landfills, through composting.

  There are approximately 462 active landfills in Manitoba. The Brady Landfill in Winnipeg is the largest landfill in Manitoba, emitting 273,420 tonnes of CO_2e annually. The City of Brandon has completed the first phase of a study of its landfill. Results suggest that landfill gas generation will achieve GHG emissions reductions of approximately 25,000 tonnes annually, with capital costs being recouped in approximately 2.5 years.

- **Municipalities.** Through Green Manitoba, the province will develop partnerships among government departments, agencies, stakeholder organizations and the Federation of Canadian Municipalities. Manitoba government will supply support for municipalities to complete the following steps:

  1. Create greenhouse gas emissions inventories and forecasts.
  2. Set emissions reduction plans.
  3. Develop local action plans.
  4. Implement local action plans or a set of activities.
  5. Monitor progress and report on results.
  6. Implement energy and water conservation and waste reduction strategies.

- **Greening our schools.** A new Green Schools Initiative will build upon the new Green Building Policy. It will cover all new schools (and major renovations) to help enable existing schools to target energy efficiency, water consumption, waste reduction and transportation demand management programs. The program will further integrate climate change education into our schools.

Landfill Gas (LFG) is composed of a mixture of hundreds of different gases. By volume, most LFG typically contains 25 per cent to 45 per cent methane and 40 per cent to 60 per cent CO_2. GHG methane is a powerful greenhouse gas, 21 times as potent in trapping heat as CO_2.

PUBLIC TRANSIT, ACTIVE COMMUTING, AND TRANSPORTATION

- The Province of Manitoba will:
  - establish an Active Transportation Advisory Group and partner with other levels of government
  - legislate a 50/50 funding agreement to share net municipal transit operating costs (including future rapid transit) and review opportunities to improve local public transit
  - enhance active commuting infrastructure, and improve road space allocations for cyclists for safety and access
  - improve public education on road safety, targeted at cyclist and drivers
  - review opportunities to expand park-and-ride infrastructure
  - promote ride sharing and other transportation demand management programs including Resource Conservation Manitoba's Community-Based Travel Marketing pilot project

Business Opportunities:

Low-Carbon Profits

photo: Destination Winnipeg Inc./Dodique Ballet

"The investments that take place in the next 10 to 20 years will have a profound effect on the climate in the second half of the century and in the next. Our actions now and over the coming decades could create risks of major disruption to economic and social activity, on a scale similar to those associated with the great wars and the economic depression of the first half of the 20th century. And it will be difficult or impossible to reverse these changes."

- Stern Review on the Economics of Climate Change, October 2006

In Manitoba, industrial and commercial activities account for only two per cent of our total emissions. Not only are our industrial emissions relatively low, due to Manitoba's abundance of clean power, but **Manitoba businesses can also make and save money by implementing climate friendly practices** and work towards green economic development.

An increasing number of studies (ex: Dow Jones Sustainability Index, Social Investment Forum Foundation) show there is a significant correlation between positive financial performance and corporate social and environmental policies and practices. In fact, recent studies (ex: Stern Review on the Economics of Climate Change (UK)) show it is significantly more costly to do nothing. Using the results of formal economic models, the review estimates that if we don't act, the overall costs and risks of climate change will be equivalent to losing at least five per cent of global GDP each year. If a wider range of risks and impacts is taken into account, the estimated losses could rise to 20 per cent of GDP per year, or more.

Today, global corporate leaders that influence business in Manitoba (ex: Goldman Sachs, Lloyd's of London and PricewaterhouseCooper) are advising their clients to prepare for the business impacts of climate change. This is a trend that could have local impacts on access to capital, insurance premiums and assessments of risks and liabilities. At the same time, markets for greener products are growing. Examples of these products include renewable energy, energy efficiency products and services, low-emitting vehicles, buses and trucks, green building design and materials, sustainable food and forest production.

Increasing oil and gas costs, investor concerns about climate-change related risks, and costly inefficiencies in our businesses, all affect our ability to compete. By trimming wasteful practices and taking advantage of emerging markets for low-carbon products, our local companies can save money, make money, protect people and the environment and be better prepared for the future.

While many Manitoba companies are benefiting from Manitoba Hydro's Power Smart and other lean manufacturing programs to improve their energy efficiency and reduce material consumption, many more businesses have not taken advantage of these savings. Many small and medium-sized (SME) companies find it challenging to allocate time and resources to reduce their consumption of energy, water, materials and toxic substances. Yet, by doing so, they can improve productivity and their competitiveness in the marketplace. Businesses that do make a commitment to pursue climate friendly practices will be better able to take advantage of the opportunities that lie ahead.

There are particular sectors within the province that are positioning themselves for growth within a green and carbon-constrained economy. As outlined earlier in this plan, Manitoba's clean energy sector is poised for growth. Geothermal power is generating annual sales of over $30 million; investment in wind power is growing; construction of the Wuskwatim dam is underway; biofuels production is expanding to meet Manitoba's mandates; there is support for biomass sources for heating; and green building design and construction will become a growing industry thanks to new policies and private industry interest. Other areas including bioproducts and sustainably grown agricultural products are expected to benefit from new markets.

In addition, Manitoba is home to some of the largest insurance companies in Canada, including Great-West Life, Federated Insurance Co. and Wawanesa Insurance. There is a growing international trend encouraging insurers to calculate the potential risk of climate change to industry. This presents an opportunity to collaborate more closely with this sector, to educate the business community on the advantages of reducing their risks and preparing for the impacts of climate change.

Actions to date

- **Manitoba's Manufacturing Investment Tax Credit** targets plants and equipment purchased for use in manufacturing or processing in Manitoba. Qualified property includes Class 43.1 renewable energy and energy conservation equipment and is extended to expire in 2020 instead of 2012
- **The Green Energy Manufacturing Tax Credit** promotes the production and purchase for use in Manitoba of new machinery and equipment used to generate renewable energy. The refundable income tax credit will be equal to 10 per cent of the value of qualifying property produced in Manitoba and sold for residential or commercial use in Manitoba before 2019. Qualifying property will initially include equipment for wind power, solar energy, geothermal energy and hydrogen fuel cells.
- In December 2005, with Manitoba industries working together, our province met its commitment to implement measures under **Canada's National Action Plan on Ozone Depleting Substances (ODS) and Other Halocarbons** by amending the ODS regulation to include hydro fluorocarbons (HFCs) and perflurorocarbons (PFCs), both potent greenhouse gases.
- Since 2001, Manitoba Hydro has expanded energy efficiency programs that provide direct benefits to small and medium-sized businesses.
- During 2006, the provincial government supported the development of a business guide on climate change with the Manitoba Chamber of Commerce and the Climate Change Connection, our public education hub. One hundred and eighty copies of this document were distributed throughout Manitoba and an electronic version is available at **www.climatechangeconnection.org**.
- In October 2006 in Winnipeg, Manitoba hosted the largest **Canadian Wind Energy Association national conference** and trade show to date. Nearly 1,400 people travelled to Winnipeg to investigate this rapidly growing industry.
- In October 2007, Manitoba Science, Technology, Energy and Mines hosted **Manitoba's Green Future: A Dialogue on Climate Change Action and Greening our Economy**. This conference brought together business and community leaders to address the risks and opportunities presented by climate change. This all-day event was sold out early, with over 250 Manitobans participating. The workshops provided an opportunity to explore strategies and actions participants and their governments will need to pursue into the future.

New Flyer Industries has capitalized on export markets by becoming the leader in manufacturing hybrid and alternative fuel buses. During early 2005, Manitoba hosted the first hydrogen-engine-powered bus on-road test in Canada. A hydrogen hybrid internal combustion engine (HHICE) cold weather test was conducted in Winnipeg. A New Flyer bus, equipped with an HHICE, was tested in regular service. In 2010, the Vancouver Winter Olympics will host the world's largest fleet of zero-emission hydrogen buses, all manufactured by New Flyer Industries.

LOEWEN WINDOWS, Steinbach

Loewen manufactures triple glazed windows which are the most thermally efficient products in the market. They are the only North American window manufacturer that offers Forest Stewardship Council (FSC) certified wood windows which are accepted for Leadership in Energy and Environmental Design (LEED®) credit in buildings. Heat for their 600,000 sq. ft. manufacturing plant is created with their own wood off cuts. The resultant sawdust is sold to the local farming community for animal bedding.

GRANNY'S POULTRY

Its new head office and hatchery is the most energy efficient, technologically advanced hatchery in the world, using a unique combination of heat recovery, geothermal, and state-of-the-art energy management systems. They raised the temperature of fresh -29°C outside air to +19°C using geothermal heat to pre-heat the air and by capturing the natural heat from embryos in incubating eggs. The geothermal system will also provide all cooling requirements in summer months, eliminating the need for rooftop HVAC units. The new closed-loop system in the hatchery is projected to result in a 70 to 80 per cent reduction in water consumption and discharge.

Manitoba's environmental consulting firms are helping building owners become part of the climate change solution. Milestone Project Management is a Manitoba-based business that helps with the sustainable practices of deconstructing buildings and using recycled materials in retrofitting or new construction. The business' locally acquired expertise is now being used in the southern U.S. to help with the reconstruction following Hurricane Katrina.

- In November 2007, Manitoba hosted Canada's first Plug-In Hybrid Electric (PHEV) conference and showcase.
- Manitoba has launched an enhanced oil recovery strategy that will reduce Manitoba's GHG emissions by storing CO_2 in oil reservoirs.

Next steps: to 2012 and beyond

- **GREEN ECONOMY JOBS OF THE FUTURE.** The provincial government recently announced that a new $15.1 million training facility would be built at Red River College specifically focused on leading-edge research for the new green economy. The facility will open the door to train the skilled workforce that will be needed for Manitoba's growing green economy.
- **SMART SHOPS.** A new program will be launched to provide practical onsite tools to conserve energy and water and reduce waste in Manitoba's small and medium-sized business community. Green Manitoba and Manitoba Hydro will help small and medium-sized business owners identify actions they can take, programs that exist to implement changes and access information required to take the next steps to green their operations.
- **MANITOBA CLIMATE ACTION PORTAL.** Manitoba has signed an agreement with the Canadian Standards Association and the Canadian Climate Exchange to establish a registry that will showcase emission reduction projects in Manitoba. It will also help meet demand from organizations wishing to reduce their emissions. This initiative will be linked to regional and international partnerships, including the North American climate registry that currently has approximately 40 state, regional and tribal members.
- **A GREEN BUSINESS NETWORK WILL BE FORMED IN 2008.** This group will identify fiscal mechanisms, such as tax shifting, and will compile and promote best practices and success stories that are taking place in Manitoba businesses. The International Institute for Sustainable Development (IISD) will assist in this task. The effort will include an advisory committee to the minister of Manitoba Science, Technology, Energy and Mines.

Government: Greening our Operations

Actions to date

- The Demand Side Energy Use baseline audit of 85 government buildings was completed in 2003. In total, these 85 buildings emit over 40,000 tonnes of greenhouse gases annually. The baseline audit found that the 2001/02 greenhouse gas level in the buildings was already eight per cent below 1990/01 levels.
- **The Manitoba government now uses 30 per cent post-consumer waste recycled paper** and the provincial Materials Distribution Agency (MDA) has 200 Green Choice products in its annual catalogue.
- The MDA categorizes used government assets as reusable or recyclable. Reusable items are redistributed within government or given to charitable organizations. Recyclable items are sold to companies to extract base metals.
- Waste minimization initiatives have been introduced in more than 300 government buildings.
- **The provincial light duty fleet currently has approximately 370 alternative and flexible fuel vehicles.** Fleet Vehicles Agency has a policy encouraging the use of cleaner E10 fuels broadly across the fleet.
- In evaluating future leases, the government will seek green standards and environmentally friendly products such as recyclable carpet tile, EcoLogo paints, T8 lighting and Manitoba Hydro Power Smart Program upgrades.
- Trades contractors are encouraged to provide goods, materials and services that lessen the burden on the environment, and are asked to implement green business practices.
- The Manitoba Housing Authority (MHA) is adopting energy efficiency measures (ex: high efficiency boilers, high performance windows, energy efficient lighting and insulation). These are being incorporated into ongoing modernization and improvement activities at MHA housing projects.
- In addition, through MHA's Affordable Housing Initiative (AHI), all new single family homes must be built to Manitoba Hydro Power Smart standards, and the MHA is currently offering a homeowner and tenant training program in northern Manitoba that includes training on improving energy efficiency.
- The delivery of government services through the Internet, over the phone, multiple services at over-the-counter centres and expanded broadband service will improve citizen satisfaction in addition to helping the environment.

Leading by example in government

The Manitoba Government is committed to energy efficiency, water conservation, waste minimization and greening its vehicle fleet to reduce emissions from its own operations.

Next steps

- **GREEN BUILDING POLICY FOR NEW CONSTRUCTION AND MAJOR RENOVATIONS.** The province's new green building policy applies to all commercial and institutional projects that are funded by the Government of Manitoba, including Crown corporations. The policy requires all new capital projects, including schools and health-care facilities, to exceed LEED® Silver certification. This policy will be mandated in new climate change legislation.
- **GREENING OUR PROVINCIAL BUILDINGS.** Manitoba Infrastructure and Transportation and Manitoba Science, Technology, Energy and Mines are working to review and implement rating systems for existing government buildings. These will take into account a building's actual performance. The government will use what it learns from this review to develop strategies and operational practices to ensure government buildings operate at optimum efficiency. The government will work with Manitoba Hydro through the Commercial Building Optimization Program to review and improve energy savings and occupancy comfort in existing government buildings.
- **GREENING THE PROVINCIAL GOVERNMENT FLEET.** Starting with an executive fleet policy requiring the use of hybrid vehicles, the province will develop a policy to reduce fossil fuel use and greenhouse gas emissions from its vehicles. Departments and agencies will be required to reduce the amount of gasoline and diesel used in fleet vehicles by increasing vehicle fuel economy, operating efficiency and reducing the number of miles driven by employees. Departments will be required to limit the purchase or lease of four-wheel drive sport utility vehicles and similar vehicles to situations where there is a clear business need. Priority will be placed on hybrid gas/electric and other fuel-efficient/low-emission vehicles. The Fleet Vehicles Agency will identify vehicles that meet the requirements of Manitoba's green fleet objectives. In addition, the government is considering the feasibility of extending Winnipeg Transit's EcoPass program to provincial employees.
- **ALTERNATIVE TO TRAVEL AND TRAVEL OFFSETS FOR GOVERNMENT ACTIVITIES.** The province is working to reduce provincial employee air and land travel through the use of teleconferencing and expanded video conferencing. Greenhouse gases generated through necessary travel will be offset through verified carbon credits.
- **CLIMATE CHANGE CONSIDERATIONS IN DECISION MAKING.** Climate change impacts and adaptation will be part of the future budget, land-use and environmental assessment decision-making processes.

Adapting to Climate Change: – Preparing for the Future

Climate Change Impacts and Adaption

The process of climate change has begun. The average temperature of the Earth has increased over the past 50 years and ecosystems have begun to change. In turn, they are affecting the economies and societies they sustain. Early impacts of climate change are already being witnessed in Manitoba.

Earlier, wetter springs, warmer, drier summers and shorter, milder winters are projected by climate models to be Manitoba's future. This will have implications for our economy, natural environment, health and well-being. Adapting to climate change will bring opportunities as well as challenges.

Assessing the Impacts of Climate Change in Manitoba

WATER AND ECOSYSTEMS

The Prairies face an increased probability of extreme conditions, including flooding and severe droughts. The most serious climate change risk is increases in water scarcity.[18] Even if rainfall increases in some areas, this may be offset by higher temperatures, which will result in increased evaporation and transpiration from plants.

The boreal forest is projected to shrink as climate conditions on its southern fringe favour the growth of temperate forests and grasslands. Expansion to the north is hampered by the absence of suitable soil conditions.[19] At the same time, the availability of harvested timber will decline as forest fires and pest and disease outbreaks become more frequent.[20]

The diversity and abundance of the province's plant and animal species will also change. While some species might thrive, others, such as white spruce,[21] polar bears and woodland caribou,[22] could become endangered or extinct.

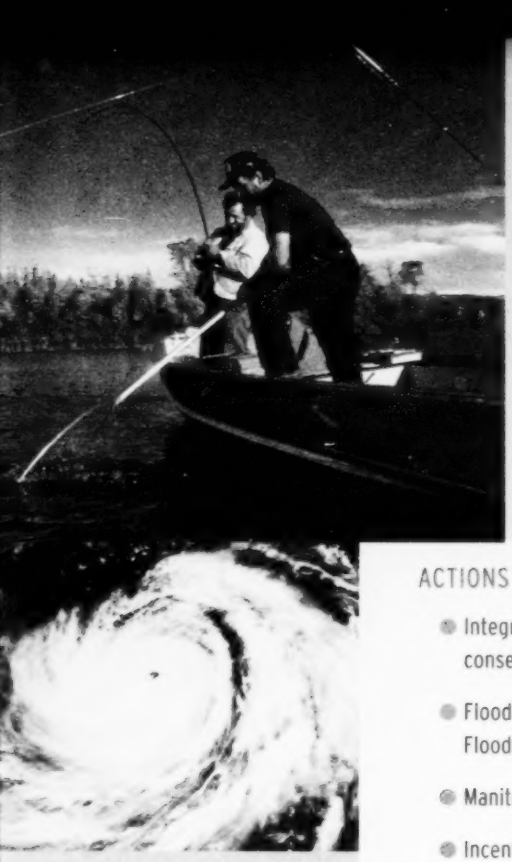
[18] Natural Resources Canada. 2007. From Impacts to Adaptation: Canada in a Changing Climate 2007. http://adaptation.nrcan.gc.ca/assess/2007/index_e.php

[19] Government of Canada. Provincial and Territorial Impacts–Manitoba. Accessed on February 23, 2006. Available at: http://www.climatechange.gc.ca/english/affect/prov_territory/manitoba.asp

[20] Government of Canada. Provincial and Territorial Impacts–Manitoba. Accessed on February 23, 2006. Available at: http://www.climatechange.gc.ca/english/affect/prov_territory/manitoba.asp

[21] Government of Canada. 2004. Forestry: Climate Change Impacts and Adaptation: A Canadian Perspective. http://adaptation.nrcan.gc.ca/app/filerepository/F808560-9915F4657B4E8C5790747BC14.pdf

[22] Government of Canada. Provincial and Territorial Impacts: Regional Impacts –Manitoba. http://www.climatechange.gc.ca/english/affect/prov_territory/manitoba.asp



A man from Poplar River First Nation was fishing on Lake Winnipeg with his son. In the distance he saw a storm emerging on the horizon. He was taught by his father how to estimate the amount of time he had to pull the nets into the boat and get off the water before the storm arrived. But the storm came up on them much faster than he had estimated. It was unlike any other storm he had experienced with his father and the boat capsized. Luckily, the man and his son were wearing life jackets and were able to swim to shore.

ACTIONS TO DATE:

- Integrated watershed management plans are being developed to address water budgeting and water conservation.
- Flood protection is being improved throughout the province, including upgrading the Red River Floodway from protection against a 1-in-90 year spring flood to a 1-in-700 year spring flood.
- Manitoba's hydrometric network is being expanded.
- Incentives such as the Riparian Tax Credit and a Nutrient Management Regulation to protect lakes and rivers are being introduced.
- A land planning initiative will combine traditional and western scientific knowledge to inform future decision-making.
- Support is being provided for the nomination of a combined 12,000 square kilometres of boreal forest land for a UNESCO World Heritage Site in Manitoba and Ontario.
- Capacity to protect forests and northern communities from fires is being enhanced.
- The polar bear has been listed as a threatened species and is being monitored. Manitoba will be the location for the world headquarters of Polar Bears International.

PUBLIC HEALTH AND EMERGENCY MANAGEMENT

The health of Manitobans and the well-being of rural, urban and First Nation communities will also be affected. Manitobans may experience heat stress, more air pollutants associated with fires and drought conditions, and exposure to water-borne diseases and disease-carrying insects.

These and other consequences of a changing climate have implications for the economic and social well-being of communities. Resource-dependent communities could face new economic challenges and communities will need to improve emergency response systems and infrastructure to withstand severe weather events.

ACTIONS TO DATE:

- Working with municipalities to establish local emergency management plans to prepare for extreme weather events and increasing the speed and effectiveness of local and regional emergency response measures.

THE NORTH

For Aboriginal and northern communities, climate change has profound implications for traditional ways of life and culture. Tourism operations and traditional activities may be altered by changes in ecosystems and in the abundance and distribution of wildlife.[23] One of the most significant negative impacts of climate change on transportation infrastructure in Manitoba is the safety, sustainability and seasonal duration of winter roads.

Northern railways with lines passing through areas of permafrost, such as the one serving Churchill, will require frequent repair as permafrost degrades. The Port of Churchill may experience more frequent and severe erosion which would affect shipping infrastructure. However, a longer ice-free season in Hudson Bay and northern channels as a result of climate change will increase shipping opportunities for the Port of Churchill.[24]

ACTIONS TO DATE:

- Manitoba is investing in the realignment of winter roads and in improved river and stream crossings along with work on all-weather roads.
- Manitoba is investing in permafrost research through the Churchill Northern Development Initiative and strategic investments are being made in the Hudson Bay Rail Line and the Port of Churchill.
- Manitoba is supporting a polar airship test flight and assistance for northern communities to develop their capacity to produce food for local consumption. Locally produced and harvested food produces considerably fewer GHG emissions than flying food into communities and provides greater food security.

Winter road challenges due to a warm 1997/1998 season resulted in an air lift of fuel and essential supplies to northern, remote Manitoba communities at a cost of approximately $12 million.

[23] Natural Resources Canada. 2002. Climate Change Impacts and Adaptation: A Canadian Perspective. http://adaptation.nrcan.gc.ca/app/filerepository/53228D320F4147B6B8A60F3EEF94CB93.pdf

[24] Natural Resources Canada. 2007. From Impacts to Adaptation: Canada in a Changing Climate 2007. http://adaptation.nrcan.gc.ca/assess/2007/index_e.php

AGRICULTURE

Earlier springs and a frost-free period in the autumn would lengthen the agricultural growing season by about three weeks[25] and could enable the expansion of crops such as corn and soybeans.[26] However, agricultural producers will also need to respond to greater variability in year-to-year weather conditions, the potential for declines in summer rains of 10 to 20 per cent, and potentially more frequent droughts and severe rains and hail storms.[27] Greater demand for irrigation water could also be expected to diminish water supply and water quality, and may have serious consequences for municipal water supplies.

ACTIONS TO DATE:

- Manitoba is encouraging the adoption of sustainable farm practices that diversify income, promote environmental health and minimize economic and ecological risk.
- The province is funding the National Water Supply Expansion Program, which enhances and protects vital water resources to help address water constraints in agricultural areas.
- Manitoba's agricultural meteorological network collects a variety of data throughout the growing season at strategic locations throughout Manitoba to use as a basis for weather projections.

Building on Manitoba's Capacity to Adapt to a Changing Climate

NEXT STEPS:

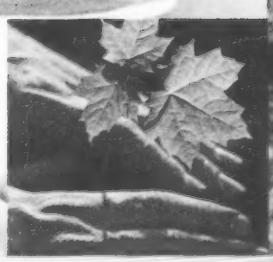
- Implementing new regulations and policies to protect our water quality, including restricting phosphorus from dishwasher detergent and overloading of nutrients into our waterways. Continued investments in flood protection and drinking water and waste water infrastructure and a new water conservation initiative to be introduced in 2008.
- Expand emergency preparedness initiatives to help Manitobans manage extreme weather events and public health issues.
- Expand the Northern Healthy Foods Program, all-weather transportation infrastructure and local renewable energy options for Northern communities. In addition, greater resources will be dedicated to polar bear and northern climate impacts research, including incorporating traditional knowledge to strengthen adaptive capacity for northern communities. Manitoba will also continue to promote new opportunities through the Port of Churchill which could become a shipping port of even greater significance for North America as the Northwest Passage opens up.
- Monitor the impacts of climate change on wildlife including monitoring programs for species at risk, including the Boreal Woodland Caribou.
- Assess the adaptive benefits of the new sustainable agriculture program practices to help build resiliency on the farm. A wetland restoration project will encourage agricultural landowners to permanently restore drained wetlands and riparian areas.
- Develop a Manitoba Climate Research Table to co-ordinate provincial research and assess needs based on climate change impacts and adaptation.

[25] Wall, Ellen, Smit, Barry, Wandel, Johanna. 2004. Canadian Agri-food Sector Adaptation to Risks and Opportunities from Climate Change. Position Paper on Climate Change Impacts, and Adaptation in Canadian Agriculture. C-CIARN, 2004. http://www.c-ciarn.uoguelph.ca/documents/c-ciarn-ag-position-paper.pdf

[26] Natural Resources Canada. 2002. Climate Change Impacts and Adaptation: A Canadian Perspective. http://adaptation.nrcan.gc.ca/app/filerepository/5322BD32DF4147B6B8A6DF3EEF94CB93.pdf

[27] Manitoba Clean Environment Commission and the International Institute for Sustainable Development. Manitoba and Climate Change: A Primer. http://www.iisd.org/pdf/rc_2nd_ed_wcov.pdf

Individuals:
What You Can Do



The human brain now holds the key to our future. We have to recall the image of the planet from outer space... a single entity in which air, water, and continents are interconnected. That is our home.

-David Suzuki

Reduce energy consumption

In Manitoba, energy use is the one activity that emits the largest amount of greenhouse gas (GHG) emissions. Fortunately, there are easy, economical choices to reduce the energy we use.

- Buy energy-efficient lights and appliances. Turn them off when you aren't using them.
- Use a timer on your car's block heater and seasonal outdoor lights.
- Make sure your home and buildings are properly insulated.
- Use your blinds and drapes wisely: window coverings keep the sun's heat out during the summer days and trap heat inside during cold winter nights.
- In summer, turn the temperature setting UP (25 °C instead of 20°C) on your air conditioner if you are leaving your home for the day. Adjust to the ideal temperature when you will be home for an extended time. Shut it off completely if you are leaving for several days.
- During the winter, turn DOWN your thermostat a couple of degrees when you aren't home, and then again at night (it's healthier). A digital programmable thermostat is an excellent investment.
- Make sure the temperature control on your hot-water heater isn't set too high. Don't forget to set it to "vacation" when you're away for extended periods.
- Plant deciduous (leafy) trees on the south side of your home to provide cool shade during the summer and allow sunshine through during the winter. Choose local species because they are adapted to Manitoba's climate and require less water and maintenance.
- Plant coniferous (evergreen) trees on the north side of your home to protect your home from cold winter winds. They also provide welcome shelter for winter birds.

ADDITIONAL RESOURCES

Climate Change Connection - Tips for Climate-Friendly Living
www.climatechangeconnection.org/pages/tips_cfl/tips_heat.html

Manitoba Hydro Power Smart for your home
www.hydro.mb.ca/saving_with_ps/psmart_home.shtml

In your car

In Manitoba, the transportation sector uses the most energy and is therefore the greatest source of GHG emissions. Fossil fuel burning vehicles generate over one-third of the province's climate changing pollutants.

The use of single passenger vehicles is one of the most influential ways Manitobans contribute to global greenhouse gas emissions. Fortunately, it's easy to get started on the road to more sustainable transportation choices.

- Leave the car at home whenever you can.
- Walk, cycle, run or skate to reduce GHGs and gain a variety of health benefits.

When you do drive, here are a few driving and maintenance tips to consider.

- Check your tire pressure twice a month, especially in changing weather. Under-inflated tires cause greater drag, reducing fuel efficiency by up to five per cent. Be especially vigilant during cold weather, when air volume is reduced due to low temperatures.
- Avoid idling. Just 10 seconds of idling burns more fuel than restarting your engine. If you aren't going anywhere, shut your engine OFF.
- Travel at moderate, steady speeds. Posted speed limits are not just for safety. They also represent optimal rates of travel that maximize vehicle fuel efficiency.
- Lessen your impact by buying a more efficient vehicle or using an ethanol-blended fuel.

ADDITIONAL RESOURCES

Climate Change Connection Tips for Climate-Friendly Living
www.climatechangeconnection.org/pages/tips_cfl/tips_transport.html

Downloadable Tips for Drivers
www.climatechangeconnection.org/pages/tips_cfl/tips_transport.html

Working with cities and communities

Studies have shown that if you stop throwing everything into the garbage and begin recycling, you can cut the amount of household waste you produce by 40 per cent! Biodegradable waste in landfill breaks down anaerobically, producing methane gas. Methane is 21 times more powerful than carbon dioxide as a contributor to climate change.

- Reduce the amount of paper you receive in your mailbox.
- Avoid plastic bags at the checkout. Bring your own re-usable bags. Buy products with the least packaging.
- The more you recycle, the fewer trips to take out the trash and the more recyclables diverted from landfill. Contact your local municipal office for more information.
- Ask Green Manitoba about your local hazardous waste and used oil disposal depots.
- Consider composting your organic waste.
- Maximize greenery. Every bit of greenery helps clean the air, sequesters carbon dioxide and prevents soil erosion.
- Greenery doesn't have to mean huge lawns. Try attractive, no-mow groundcovers and other creative landscaping alternatives to cut down on your grass cutting emissions.
- Nitrogen-based fertilizers produce nitrous oxide, which traps 310 times more heat reflected from the Earth than carbon dioxide. The average suburban lawn is deluged with 10 times as much chemical fertilizer per hectare as farmland. Use mulched clippings instead.
- Buy food that is grown and processed locally, and products that are sourced and manufactured in your region, to reduce the emissions that come from the packaging and transportation.

ADDITIONAL RESOURCES

Climate Change Connection - Tips for Climate-Friendly Living
www.climatechangeconnection.org/pages/tips_cfl/tips_yard.html

Climate Change Connection Shopping and Consuming Tips
www.climatechangeconnection.org/pages/tips_cfl/tips_shop.html

City of Winnipeg Blue Box Recycling
www.winnipeg.ca/waterandwaste/recycle/bluebox.stm

City of Winnipeg Household Hazardous Waste
www.winnipeg.ca/waterandwaste/garbage/hhw.stm

Green Manitoba Waste Minimization
www.greenmanitoba.ca/cim/1001C1_1T376T3T377.dhtm

Resource Conservation Manitoba Compost Action Project
www.resourceconservation.mb.ca/cap/

At work

Reducing operating costs can be a fine balance between maintaining quality and efficiency and minimizing excess spending. When it comes to saving energy and resources, and reducing GHGs, better bottom-line business practices also mean climate-friendly living.

- Turn off your electronic equipment or, if you can't turn it off, make sure the power management or energy saving features are turned on.
- Manitoba Hydro's Power Smart program offers lighting program incentives to businesses looking to make their lighting systems more efficient, effective and climate-friendly. For more information, contact the Power Smart Lighting Program at **204-474-3403** (toll free 1-888-624-9376) or online at: **www.hydro.mb.ca/saving_with_ps/psmart_lighting.shtml**).
- **Get on board the Commuter Challenge**. This program is designed to encourage organizations of all types and sizes to adopt more climate-friendly commuting practices, such as car pooling, increased transit use and active transport. For more information, contact Resource Conservation Manitoba at **204-925-3773** or online at: **www.resourceconservation.mb.ca/gci/gci.html**.
- If you are thinking about building new facilities, consider earth energy. Geothermal heat pumps are among the most energy efficient and environmentally friendly electric heating and cooling systems available.
- Photocopy or print on both sides of the page. Put a reusable tray on your copier/printer where old, one-sided documents can be reused for rough copies or internal communications.

ADDITIONAL RESOURCES

Climate Change Connection Tips for Business
www.climatechangeconnection.org/pages/tips_cfl/tips_office.html

Manitoba Hydro Earth Energy for Business
www.hydro.mb.ca/earthpower/for_your_business.shtml

Manitoba Hydro's Power Smart for Business
www.hydro.mb.ca/power_smart_for_business/index.shtml

Manitoba Hydro's Power Smart for Industry
www.hydro.mb.ca/power_smart_for_industry/index.shtml

GLOSSARY OF TERMS

Afforestation • This is the process of establishing and growing forests to remove greenhouse gases from the atmosphere on land which has not been forested in recent history.

Biodiesel • Biodiesel is a fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats and produced using an accepted industry-wide quality assurance program.

Carbon Dioxide Equivalent • CO_2e, is an internationally accepted measure that expresses the amount of global warming of greenhouse gases (GHGs). It is expressed in terms of the amount of carbon dioxide (CO_2) that would have the same global warming potential.

Carbon Sequestration • This is the uptake and storage of carbon through natural processes. Plants, for example, absorb carbon dioxide and transform it into plant sugars that contain carbon.

Climate • The average weather, usually taken over a span of 30 years, for a particular region and time period is called climate. It is not the same as weather, which describes the short-term state of the atmosphere. Climate is the average pattern of weather for a particular region. Climatic elements include precipitation, temperature, humidity, sunshine, wind velocity and phenomena such as fog, frost and hailstorms. (See also weather.)

Climate Change • A change in expected climatic conditions that is in addition to natural climate variability over comparable time periods is a climate change. This change may be attributed directly or indirectly to human activity that alters the composition of the global atmosphere.

Demand-Side Management • The planning, implementation, and monitoring of activities designed to encourage consumers to modify patterns of energy consuming activities including the timing and level of demand. Demand-side management may refer to energy conservation programs (energy demand-side management) or strategies that result in more efficient use of transportation resources (transportation demand-side management).

E10 • A fuel containing a mixture of 10 per cent ethanol and 90 per cent gasoline.

E85 • A fuel containing a mixture of 85 per cent ethanol and 15 per cent gasoline.

Emissions • These are the release of pollutants that can be transformed into greenhouse gases, and/or the direct release of greenhouse gases, into the atmosphere over a specific area and period of time.

Emissions Trading • Article 17 of the Kyoto Protocol establishes a mechanism through which those countries with emissions commitments (industrialized countries) may trade their emission allowances with other industrialized countries that are parties to the protocol. For example, if a company in Canada reduces its greenhouse gas emissions to less than what it was emitting in 1990, it will have an emissions credit. The company could then sell its emission credit to an Australian firm that has not been able to reduce its emissions to 1990 levels in the necessary time frame. The aim of emissions trading is to improve the overall flexibility and economic efficiency of making emissions reductions.

Ethanol • Ethanol is a high-octane, water-free alcohol that is produced from renewable resources such as corn, wheat, straw and other bio-mass. Ethanol can be used as a fuel, as an additive to fuel or fuel extender, and as an industrial chemical. When ethanol is blended with gasoline, the result is a cleaner, higher-octane fuel than regular gas.

Fossil Fuel • This is a general term for combustible carbon deposits of biological origin, including coal, oil, natural gas, oil shales and tar sands. These fuels emit carbon dioxide into the atmosphere when burned, significantly contributing to the greenhouse effect and climate change.

Global Warming • An increase in the near surface temperature of the Earth is called global warming. Global warming has occurred in the distant past as the result of natural influences. However, the term is most often used to refer to the warming occurring as a result of increased emissions of greenhouse gases. Scientists generally agree that the Earth's surface has warmed by about 0.6°C in the past 140 years. The Intergovernmental Panel on Climate Change (IPCC) recently concluded that increased concentrations of greenhouse gases are causing a rise in the Earth's surface temperature.

Greenhouse Effect • This is the effect produced as greenhouse gases allow incoming solar radiation to pass through the earth's atmosphere. At the same time, prevents most of the outgoing infrared radiation from the surface and lower atmosphere from escaping into outer space. It is like a glass greenhouse capturing the sun's warmth and heating the interior space. This process occurs naturally and, historically, has kept the earth's temperature at about 33°C warmer than it would otherwise be. Current life on earth could not be sustained without the natural greenhouse effect. (See also Global Warming.)

Greenhouse Gas • Any gas that absorbs infrared radiation in the atmosphere is called a greenhouse gas. Greenhouse gases include water vapour, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), halogenated fluorocarbons (HCFCs), ozone (O_3), perfluorocarbons carbons (PFCs), sulphur hexafluoride (SF_6) and hydrofluorocarbons (HFCs).

Intergovernmental Panel on Climate Change (IPCC) • Composed of the world's leading climate scientists, the IPCC was established in 1988 by the World Meteorological Organization and the United Nations Environment Program. Its role is to assess scientific, technical and socio-economic information that helps our understanding of the risks associated with human-induced climate change.

Integrated Watershed Management Plan • A watershed is a defined area that gathers rainfall and other precipitation and directs it to rivers, lakes or streams. A watershed management plan sets out local priorities and actions for the users of the watershed to ensure a healthy watershed can be maintained. Integrated watershed management plans consider the provincial land-use policies, existing development plans and zoning bylaws. They must also specify linkages between water management and land-use planning, and require consultation between the water planning authority and the planning district.

Kyoto Protocol • This international agreement was reached in 1997 in Kyoto, Japan. It extends the commitments of countries that supported the UN Framework Convention on Climate Change. In particular, it sets targets for future emissions in developed countries.

Methane (CH_4) • This is a hydrocarbon that is one of the six greenhouse gases to be controlled under the Kyoto Protocol. Methane is produced through anaerobic (without oxygen) decomposition of waste in landfills, animal digestion, decomposition of animal wastes, production and distribution of natural gas and oil, coal production, and incomplete fossil fuel combustion. The atmospheric concentration of methane has been shown to be increasing at a rate of about 0.6 per cent per year. Its current concentration of about 1.7 parts per million by volume (ppmv) is more than twice its pre-industrial value. However, the rate of increase of methane in the atmosphere may be stabilizing.

Mitigation • Attempts to slow the process of global climate change by lowering the level of greenhouse gases in the atmosphere are referred to as mitigation. One of the principal means of mitigating climate change is reducing the production of greenhouse gases.

No Regrets • Measures that produce benefits equal or exceeding their costs are referred to as "no regrets." These benefits include improved performance or reduced emissions of local/regional pollutants. They exclude the benefits of climate change mitigation (See Mitigation). They are sometimes known as "measures worth doing anyway."

Sequestration • The process of absorbing carbon dioxide out of the air through the process of photosynthesis is called sequestration. It converts carbon dioxide into plant sugars containing carbon

Sink • An ecosystem, such as the oceans, forests or soils, that removes and stores carbon from the air is called a sink. The sink is a means of removing a chemical or gas, such as carbon dioxide or methane, from the atmosphere and placing it in a permanent or semi-permanent repository by transforming it into another substance. Trees, for example, can be carbon sinks because they are able to convert carbon dioxide from the air into plant sugars through the process of photosynthesis.

Sustainable Development • This is a broad concept referring to the need to integrate the satisfaction of near-term economic, social and environmental interests with the protection of the interests of future generations, including their need for a safe and healthy environment. The 1987 UN World Commission on Environment and Development defined sustainable development as meeting "the needs of the present generation without compromising the ability of future generations to meet their needs."

T8 Lighting • T8 fluorescent lights are slim, high-efficiency tubes that provide additional light and improved light quality compared to traditional T12s. T8s are up to 30 per cent more efficient and provide quiet, flicker-free operation, resulting in a more comfortable environment.

Weather • This is the specific condition of the atmosphere at a particular place and time. It is measured in terms such as wind, temperature, humidity, atmospheric pressure, cloudiness, and precipitation. In most places, weather can change from hour to hour, day to day, and season to season. Climate is the average of weather over time and space. A simple way of remembering the difference is that 'climate' is what you expect (ex: cold winters) and 'weather' is what you get (ex: a blizzard).

Zero Till • Zero till or no-till farming is an economically viable, erosion-proof production system in which this year's crop is planted directly into the stubble from the previous year's crop with minimum soil disturbance.

Notes:

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